TRANSACTIONS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY

HELD AT PHILADELPHIA

FOR PROMOTING USEFUL KNOWLEDGE

NEW SERIES—VOLUME 62, PART 4

1972

PREHISTORIC RESEARCH IN AFGHANISTAN (1959-1966)

LOUIS DUPREE

American Universities Field Staff; Adjunct Professor of Anthropology, Pennsylvania State University

In collaboration with

J. LAWRENCE ANGEL
ROBERT H. BRILL
EARLE R. CALEY
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THE AMERICAN PHILOSOPHICAL SOCIETY

INDEPENDENCE SQUARE

PHILADELPHIA

APRIL, 1972

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OF

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Library of Congress Catalog
Card Number 75-184166
International Standard Book Number 0-87169-624-X

PREFACE

This monograph presents several preliminary statements concerning the archaeological work done from 1959 to 1966 by the American Museum of Natural History in collaboration with the National Museum of Afghanistan (Kabul), and replaces earlier reports.[1] Little reference is made to work outside Afghanistan, not because it is irrelevant, but because our own studies continue and we have reached no definite conclusions.

However, we feel that an outline of our work in the relatively unknown and neglected field of Afghan prehistory should be made available at this time, so that interested scholars can begin their own evaluation in the same tentative spirit with which this monograph was compiled.

At various times, many educational foundations and institutions have contributed to our research since 1959, and we most gratefully acknowledge these manifestations of monetary and material assistance from the following: American Universities Field Staff; American Museum of Natural History; Pennsylvania State University; Wenner-Gren Foundation for Anthropological Research; American Philosophical Society; The JDR (John D. Rockefeller) 3rd Fund; American Geographical Society. Mr. Richard Weller contributed a generous sum to help defray the publication costs of this monograph and the collaborators gratefully acknowledge his contribution.

Many have given unquestioning assistance to our researches in Afghanistan, but space dictates that I publicly acknowledge only those directly concerned with our archaeological work. We hope we shall be forgiven for any unintentional omissions, and wish to take this opportunity to thank all who have encouraged the several phases of our overall research.

Two Ministers of Education (Dr. Ali Ahmad Popal; Dr. Mohammad Anas), three Ministers of Information and Culture (Said Qassim Rishtya; Mohammad Hashim Maiwandwal; Mohammad Osman Sidqi), three Directors of the National Museum of Afghanistan (Professor Ahmad Ali Kohzad; Dr. Abdul Rahim Ziai; A. A. Motamidi) were primarily responsible for our negotiations with the Royal Government of Afghanistan. In addition, Mr. Mohammad Ibrahim Sharifi, Director-General of Cultural Affairs, Ministry of Information and Culture, greatly assisted in obtaining the necessary permissions.

Several times, especially during the 1962 and 1965 excavations at Aq Kupruk, the U. S. Agency for International Development/Afghanistan permitted us to transport equipment to north Afghanistan in their vehicles making regular runs to the Darra-i-Suf coal mines, and for this we are most grateful. We also thank Colonel Roland Hamelin, U. S. Military Attaché in Kabul, for the loan of a vehicle to transport equipment for our 1966 excavations in Badakhshan.

The following are acknowledged for their participation in our various surveys and excavations: Dr. Abdul Rauf Wardak and Abdul Razak (1959 survey); Dr. and Mrs. Klaus Fischer and M. Shahristani (1961, Pol-i-Zak); Charles Prewitt, John Reynolds, Blaine Turner (1962, Aq Kupruk); Jeffery Miller, Julian Orr, Robert Shaw (1963 abort, because of floods); Mohammad Ibrahim Khan, Dr. Dexter Perkins, Charles Kolb, Roger Rose, J. C. Burgess, D. Burgess, (1965, Aq Kupruk), Mohammad Ibrahim Khan, Dr. Dexter Perkins, Charles Kolb, P. Gouin, J. C. Burgess, Kenneth Cutler, Mohammad Rasul, Gul Nur, L. Benjamin Sargent, Chris Auburn (1966, Badakhshan).

Nancy Hatch Dupree served as a most efficient camp manager during the 1966 Darra-i-Kur (Badakhshan) field season. In addition, she made many valuable comments while typing the manuscript.

The hundreds of Afghan workmen who did most of the physical labor deserve a hundred times a hundred thanks for their quick learning of our techniques, and their tolerance toward several foreigners living in their midst.

To those contributing sections to this monograph, I extend my heartfelt thanks. I would also like to express my personal sadness over the untimely death of Miss Louisa Bellinger, who was to have prepared a chapter on the textiles. Her passing is a great loss to scholarship.

Mr. H. E. Klappert took the excellent photographs on figures 22, 39, 68, 85, 87, 88, 93, 117, 118, 122–128, 133, 152, 153, 154. Map 1 and the superb illustrations on figures 3, 18–21, 23–38, 40–67, 69–84, 86, 89–92, 95–116 are the work of Mr. Nicolas Amorosi. The other photographs were taken by collaborators as indicated. Figure 132*a* was prepared by Rafi Samizay.

Others contributed time, energy, and know-how to various problems, and we collectively thank the following: Geochron Laboratories (Cambridge, Mass.), Niedersächsisches Landesamt für Bodenforschung (Hannover, West Germany), Radiocarbon Laboratory of the Institute of Geophysics (University of California at Los Angeles), Radiocarbon Laboratory of the Department of Physics (University of Pennsylvania) (radioactive dating); David Lubell, Columbia University and University of Alberta (lithic specimens); Professor Leroy Davidson, University of California at Los Angeles (art history).

Dr. Harry L. Shapiro, retired chairman of the Department of Anthropology, American Museum of Natural History, is gratefully acknowledged for encouraging me to compile this preliminary monograph. Without his unqualified support (moral and financial), the present report would have never been published.

LOUIS DUPREE

[1] This monograph replaces earlier preliminary reports: Dupree, 1960, 1962*ab*, 1964*abc*, 1967*ab*, 1968*ab*, 1969; Dupree and Fischer, 1961; Dupree and Howe, 1963.

PREHISTORIC RESEARCH IN AGFHANISTAN (1959–1966)

CONTENTS

INTRODUCTION: OUTLINE OF WORK BY SEASON

LOUIS DUPREE

American Universities Field Staff; Adjunct Professor of Anthropology, Pennsylvania State University

> There is a lifetime of work in the caves of Afghanistan for a younger man.[2]

Archaeologists have long recognized the importance of Afghanistan in the historic periods of Asia. The Délégation Archéologique Française en Afghanistan (DAFA), excavating in the country since 1922, has uncovered some of the finest museum specimens of twentieth-century archaeology,[3] particularly at Hadda,[4] Begram,[5] Bamiyan,[6] Surkh Kotal,[7] and Ai Khanoum[8] (see map 1). These sites yielded extensive evidence of the rich cultures which flourished in Central Asia in late centuries B.C. to early centuries A.D.: the thousands of terracotta heads of Hadda[9]; the commercial hoard at Begram, with its samples of the Silk Route trade which stretched from China to

[2] Coon, 1957: p. 256.

[3] Rowland, 1966.

[4] Barthoux, 1930, 1933.

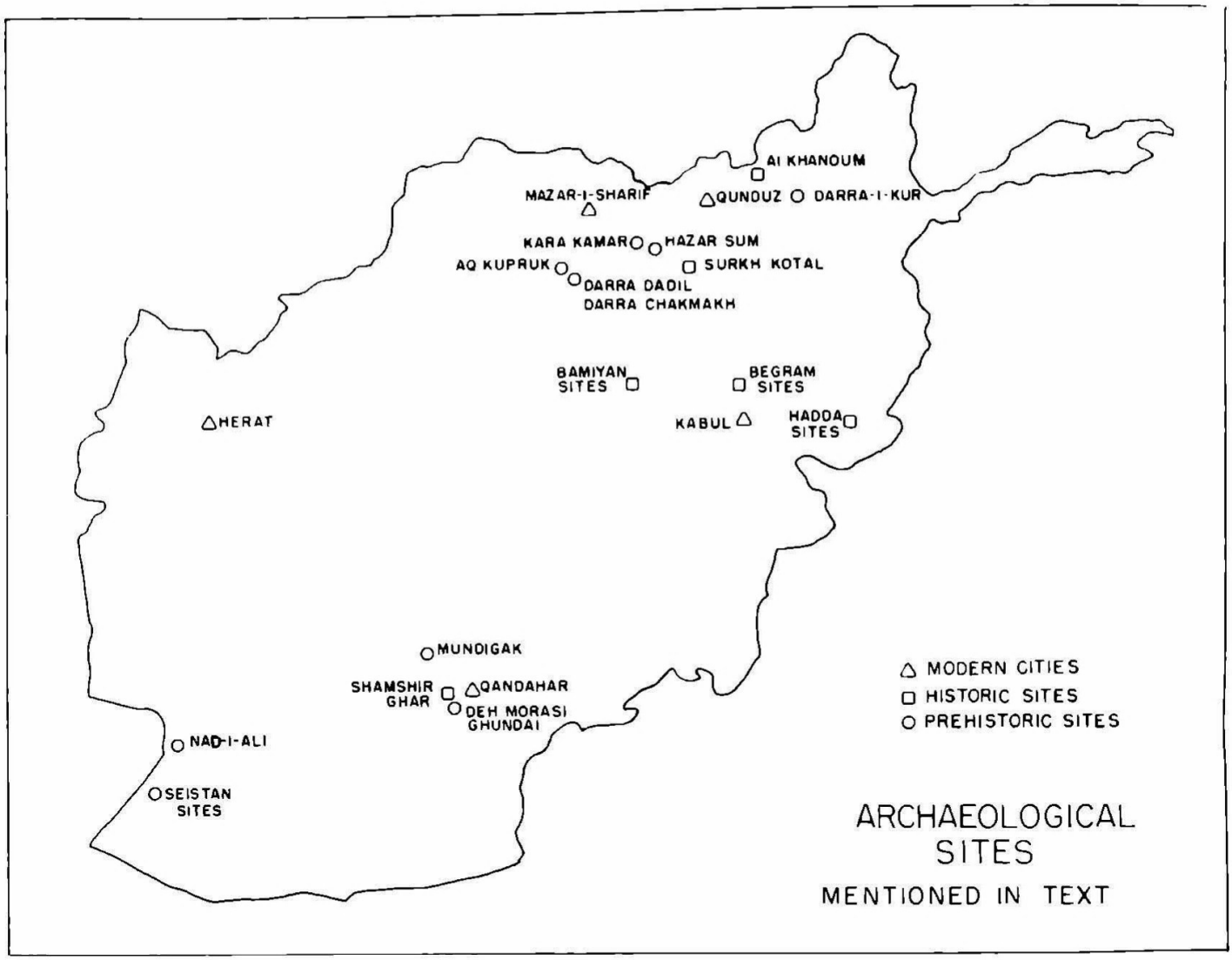
[5] J. Hackin, and R. Hackin, 1939; J. Hackin, J. Carl, P. Hamelin, 1954.

[6] A. Godard, Y. Godard, J. Hackin, 1928; J. Hackin, J. Carl, 1933.

[7] Schlumberger, 1953.

[8] Schlumberger and Bernard, 1965; Bernard, 1967; Wheeler, 1968.

[9] Recent excavations at Tapa Shotur, Hadda, by the Director-General of the Institute of Archaeology, Ministry of Information and Culture, Royal Government of Afghanistan, has greatly expanded our knowledge: M. and S. Mostamindi, 1969.



Qunduz also spelled Kunduz in text; Seistan, Sistan.

Rome; the gigantic sandstone statues of the Buddha at Bamiyan; the large, syncretic, religico-commercial site of Surkh Kotal, straddling a major north-south route from Central Asia to India; the easternmost Greek town in the world at Ai Khanoum.

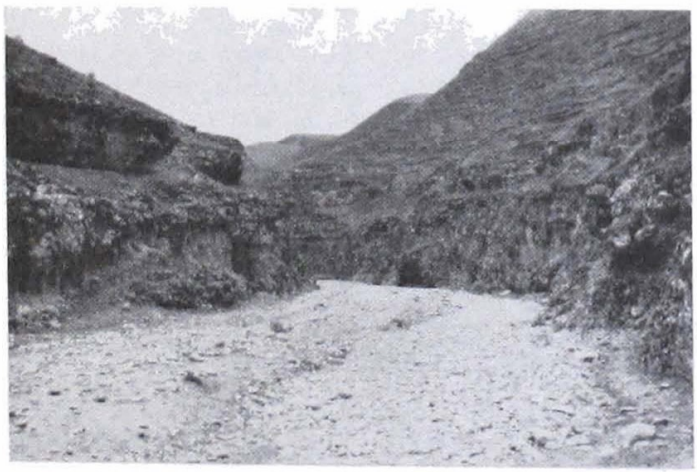


FIG. 1. Darra Dadil, 1959. Photo: Dupree.

Prehistory has been neglected, partly because of the richness of historic finds, partly because of the relative lack of interest of European scholars in prehistory outside Europe. Some work, however, was done. Just before World War II, Dr. R. Ghirshman of DAFA sunk test pits at Nad-i-Ali in Sistan (southwest Afghanistan) and found materials possibly relating to the mid-first millennium B.C.[10] Except for Ghirshman's work, the prehistoric periods of Afghanistan remained unplumbed, and few could have predicted the rich finds which would result after 1949, the date of the first archaeological survey specifically charged with the identification of prehistoric sites. Led by Dr. Walter A. Fairservis, Jr., the First Afghan Expedition of the American Museum of Natural History (summer, 1949) recorded many sites of prehistoric potential, particularly in the Qandahar area and Sistan.[11] Dr. Fairservis also directed the Second Afghanistan Expedition (1950

[10] Ghirshman, 1939.
[11] Fairservis, 1950.

1951) which excavated and surveyed in Pakistani Baluchistan.[12] After Fairservis had tested the mound of Deh Morasi Ghundai near Qandahar and moved on to extensive surveys in Sistan,[13] Dupree made more extensive excavations and uncovered a series of Chalcolithic-Bronze Age occupational levels dating from the fourth millennium B.C., to the mid-first millennium B.C.[14] The site was probably occupied by a semisedentary group; i.e., part of the people moving seasonally into the alpine pasturelands of the Hazarajat with flocks of sheep, goat and cattle, while the bulk remained in the village area to farm the adjacent land, still a common pattern in modern Afghanistan.

After Dupree finished his work at Shamshir Ghar[15] and Deh Morasi Ghundai, Jean-Marie Casal began a series of excavations (1951–1958, ten field seasons) at Mundigak, about fifty kilometers north of Deh

FIG. 2. Darra Dadil. Dr. Abdul Rauf Wardak points to flint nodules *in situ*. 1959. Photo: Dupree.

[12] Fairservis, 1956.
[13] Fairservis, 1961.
[14] Dupree, 1963.
[15] Dupree, 1958.

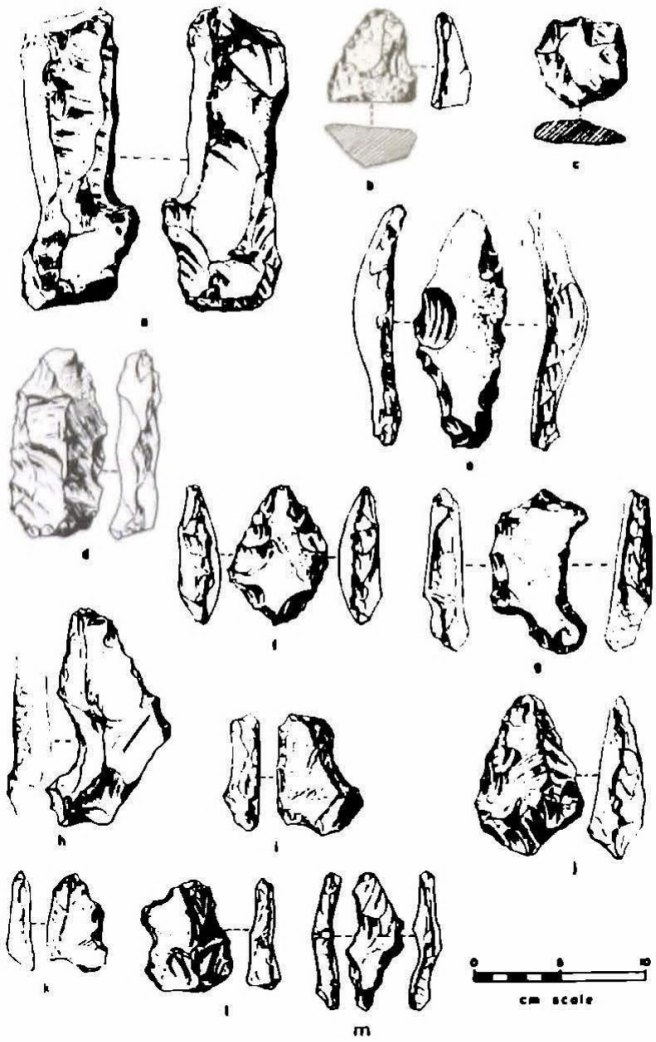


FIG. 3. Darra Dadil. Surface collected flints. 1959. Drawn by Amorosi.

Morasi Ghundai. The two sites (Deh Morasi Ghundai and Mundigak) seem to complement one another. Whereas Deh Morasi Ghundai, throughout most of its periods, represents a small, semisedentary village with a transitional economic base of wheat-barley agriculture and sheep/goat/cattle transhumance, Mundigak slowly developed from an agricultural village (with hints of semisedentarianism) to a town with a granary and probable connection with the Indus Valley Civilization.[16]

In 1954 Carleton S. Coon, a major figure in Middle Eastern cave archaeology, excavated Kara Kamar (Black Belt)[17] near Aibak (now called Samangan) and discovered at least two (and possibly four) cultural levels); (1) an amorphous flake industry at the bottom[18]; (2) an "Aurignacian" Upper Palaeolithic

[16] Casal, 1961.
[17] A common name for many caves and rock shelters in Afghanistan, so called because of the blackened interior walls, caused by numerous nomadic camp fires over the centuries.
[18] The types of "flakes" found by Coon could have been produced by the pressures of overlying deposits or trampling of animals, including humans (Bordes and Bourgen, 1951: pp. 16–18), or free fall (Clark, 1958).

blade industry; (3) another amorphous flake industry; (4) a microblade, microcore "Mesolithic."[19] Radiocarbon dates for the "Aurignacian" cluster about 32,000 B.C.; for the "Mesolithic," 10,500 B.C.

In November–December, 1959, Louis Dupree and Abdul Rauf Wardak surveyed most of the limestone foothills in northern Afghanistan from Badakhshan to west of Maimana, and recorded over 100 caves and 150 mounds of archaeological interest.[20] As a result of the survey, Dupree pinpointed five areas of major potential importance to Afghan prehistory.

1. *Chenar-i-Gunjuskan* (36°44′ N., 69°59′ E.). Two caves (Darra-i-Kur and Hazar Gusfand) in western Badakhshan had "Mousterian-like" flakes on the talus slopes. The region is watered by a combination of streams from the high mountains and local springs. Tabular bands of a very impure chert or flint (?) occur in the higher limestone strata above the caves.
2. *Tashkurghan* (now called Khulm; 36°42′ N., 67°41′ E.). Several small mounds, literally covered with microliths, sit east of Tashkurghan and may represent a transitional site occupied by man as he moved from the Hindu Kush foothills to the river valleys of the Turkestan Plains.
3. *Aq Kupruk* (36°05′ N., 66°51′ E.). At least a half dozen rock shelters were located on the terraces of the Balkh River, near the town of Aq Kupruk, south of Mazar-i-Sharif.
4. *Maimana* (34°55′ N., 64°46′ E.). Many caves were located in the limestone hills south of Maimana, and near Bel Cheragh east of Maimana. Flint abounds in the neighboring stream beds.
5. *Darra Dadil–Darra Chakhmakh*. A series of dried up stream beds (principally Darra Dadil and Darra Chakhmakh; *chakhmakh* means flint in Persian) southeast of Aq Kupruk had literally thousands of chert and flint fragments littering the gravelly terraces of the region (fig. 1). All the valleys drain in a westerly direction toward the Balkh River. Bands of undisturbed nodular (rarely tabular) flint of homogeneous high quality occur in the limestone strata (fig. 2). Many lower caves and rock shelters appear to have been washed out by water action, possibly in the late Pleistocene. Several higher caves possibly have undisturbed older occupation strata. The greatest concentrations of surface flints, caves and rock shelters occurred in Darra Dadil less than five miles north of Darra Chakhmakh.

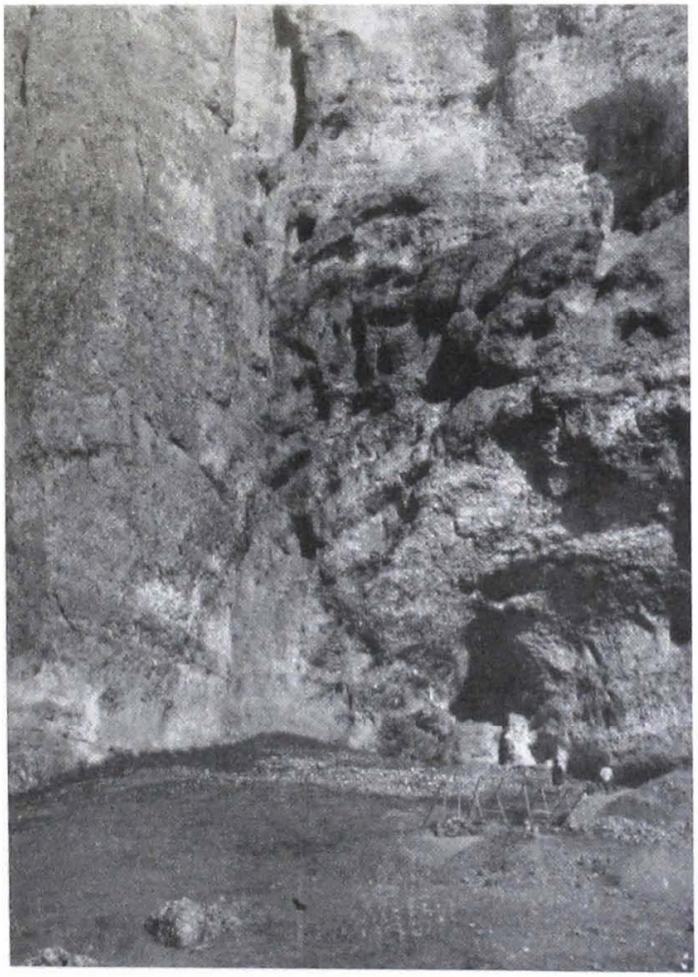


FIG. 4. Aq Kupruk I (Snake Cave). General view during 1962 Excavations. Photo: Dupree.

The most diagnostic types are represented in figure 3. The best core was a grayish flint bipolar (fig. 3*a*) specimen, with easily discernible striking platform and several flake-blade hinge fractures. Figure 3*b* illustrates a nosed or end scraper, and figure 3*c*, a discoidal scraper, with maximum utilization on the upper end. Figure 3*d–e* are elongated flake-blades probably used as straight-edged side scrapers. Figure 3*f*, although it resembles a small hand axe or large point, is probably a scraper. Figure 3*g–i* illustrate a small series of concave-edged side scrapers on flakes. Another superficial hand axe (fig. 3*j*) has flakes removed from alternate-opposite faces of the sinuous working edge, but is probably a scraper. Figure 3*k–m* are flakes with steep, alternate-opposite edge retouching, possibly a variety of denticulate.

For various reasons, excavations at any of the above localities had to be postponed until the summer of 1962. In the meantime, however, Dupree and Dr. Klaus Fischer (Bonn University) sunk a *sondage* in a mound (Pol-i-Zak) near Qala Shaharak (34°07′ N., 54°25′ E.) in the western Hindu Kush mountains about 260 kilometers east of Herat (34°20′ N., 62°12′ E.). In addition, they collected painted pottery from 30 individual mounds in the area.[21] No glazed ware appeared in the test pit, and the

[19] Coon, 1957: pp. 217–254, 317–338.

[20] Dupree, 1960.

[21] Dupree and Fischer, 1961. The Archaeological Survey of India plans to publish a definitive article on the ceramics.

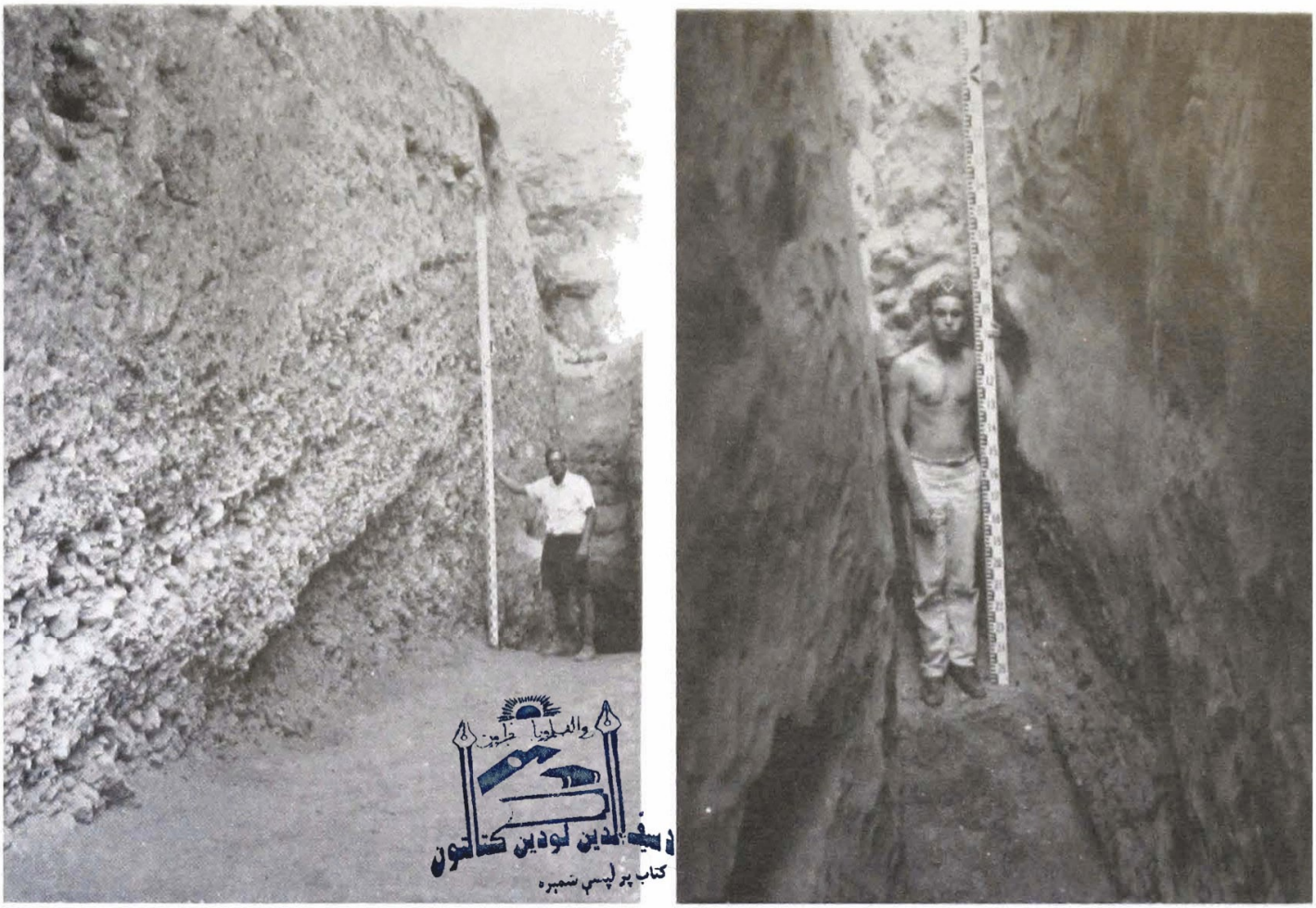


FIG. 5. Aq Kupruk I (Snake Cave). Trench I stratigraphy. (a) Gravels series begins just below top of stadia rod, sloping toward foreground. Deepest part of trench to rear behind Dr. Dexter Perkins, 1965. (b) John Reynolds standing on yellowish-clay. See Tentative Chronological Chart 1. 1962. Photo: Dupree.

radiocarbon dates of the two stratigraphic periods were 1085 ± 120 years before 1950 (Hv206) and 720 ± 110 years before 1950 (Hv205),[22] culturally Kushano-Sasanian (possibly Late Hephthalite) and Early Islamic.

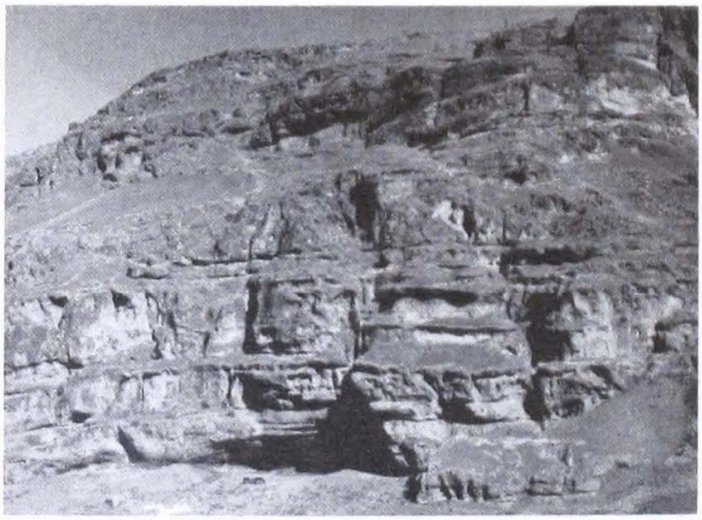


FIG. 6. Aq Kupruk II (Horse Cave). General view. 1962. Photo: Dupree.

[22] Hv is the symbol identifying work by the radiocarbon dating laboratory of the Niedersächsisches Landesamt für Bodenforschung, Hannover, West Germany.

Later work by Leshnik at Qala Ahingaran in the same general area seems to substantiate the C-14 dates from Qala Shaharak,[23] although many of the painted pottery motifs superficially resemble those of the late Indus Valley ceramics.

AQ KUPRUK

Two field seasons (summer 1962, 1965)[24] at Aq Kupruk ("White Bridge" in Uzbaki Turkic) at four localities yielded a sequence from about 20,000 years ago to a Later Iron Age (Kushano-Sasanian politically; Buddhist culturally), dating about the sixth century A.D. The four localities are named: *Ghar-i-Mar* (Snake Cave in Persian, designated Aq Kupruk I or AK I); *Ghar-i-Asp*[25] (Horse Cave, designated Aq Kupruk II or AK II); an open-air site designated Aq

[23] Leshnik, 1967.

[24] An attempt to reach Aq Kupruk in 1963 was thwarted by the most extensive, intensive floods in north Afghanistan for over half a century. Twice, the American Museum Mission almost lost its vehicles in floods.

[25] Locally, also called Kara Kamar.

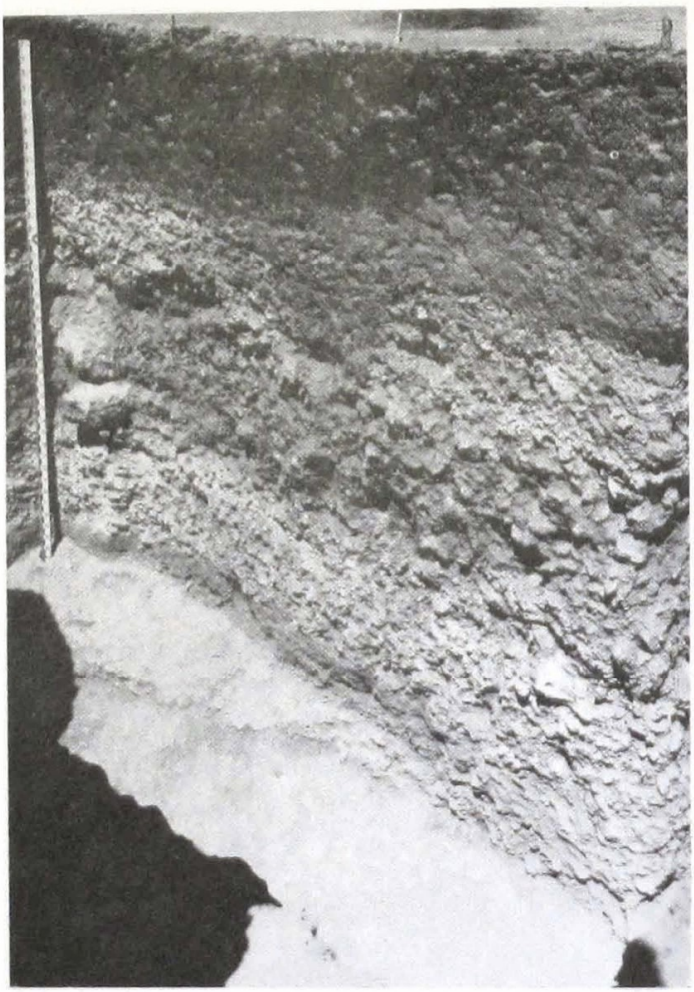


FIG. 7. Aq Kupruk II (Horse Cave). Cut 6 (left) and Trench I (right) stratigraphy. 1965. Compare with Tentative Chronological Chart 2. Photo: Dupree.

Kupruk III or AK III; Skull Cave (no name in Persian, designated Aq Kupruk IV or AK IV).

Tentative chronological charts 1, 2, 3, 4, give idealized, integrated cross sections of the Aq Kupruk localities. Detailed stratigraphic sections for each trench will be published in the final monograph.

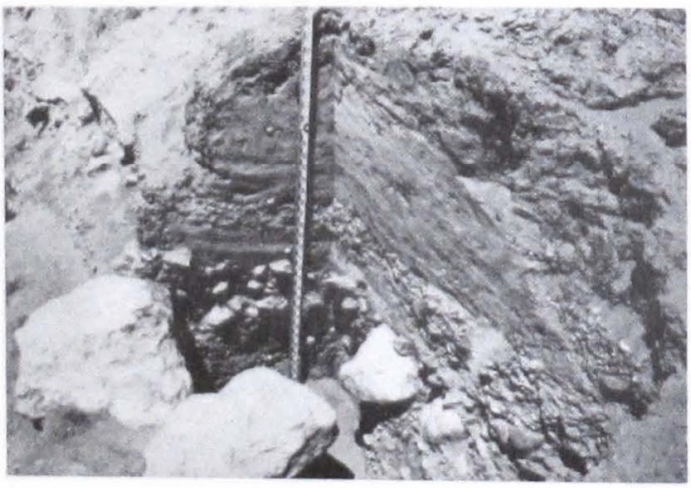


FIG. 8. Aq Kupruk III (open-air site). Stratigraphy. 1965. Note silting layer separating two lower gravel levels. Compare with Tentative Chronological Chart 3. Photo: Dupree.

FIG. 9. Aq Kupruk IV (Skull Cave). Red Streak-Pattern Burnished plate found in association with burials (Skull 4). 1965. Photo: Kolb.

FIG. 10. Aq Kupruk IV (Skull Cave). Selected items of grave furniture. Center: bronze mirror. From left to right, top row: iron dagger or knife; silver ring with lapis lazuli setting; lapis lazuli bead; iron dagger or knife. Bottom row: iron ring; 2 iron fragments; 1 iron pin; two copper or bronze rings below three carnelian beads. 1965. Photo: Kolb.

FIG. 11. Village of Chenar-i-Baba Darwesh. 1966. Photo: Dupree.

In the summer of 1962 we excavated a stepped trench, 24 meters long by 2 meters wide to a depth of about 11 meters, perpendicular to the rock shelter wall of AK I. In 1965 we extended the length of the AK I trench to 42 meters and dug down to a depth of 12 meters before striking the water table (figs. 4, 5). At AK II, we excavated a main trench perpendicular to the cave wall (24 meters long by 2.5 meters wide) down to the cave floor, which had an average depth of about 6.30 meters. Three subsequent cuts opened up areas of hearth concentration which had been identified along the face of the main trench (figs. 6, 7).

Excavation of the open-air camp site area (AK III)

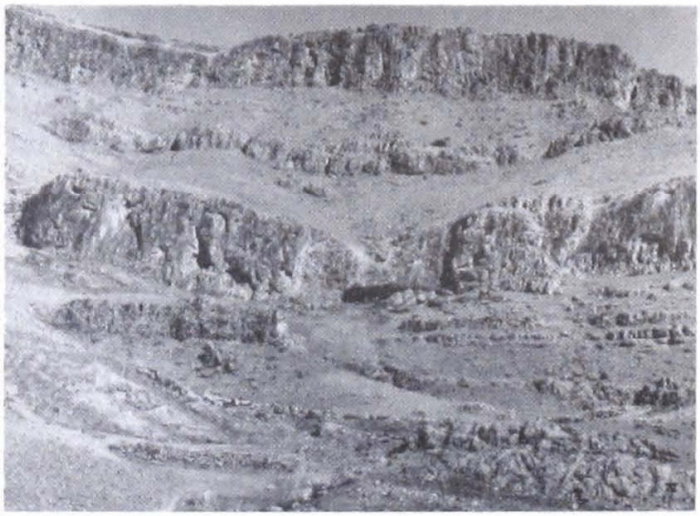


FIG. 12. Darra-i-Kur (Cave of the Valley). General view. 1966. Photo: Dupree.

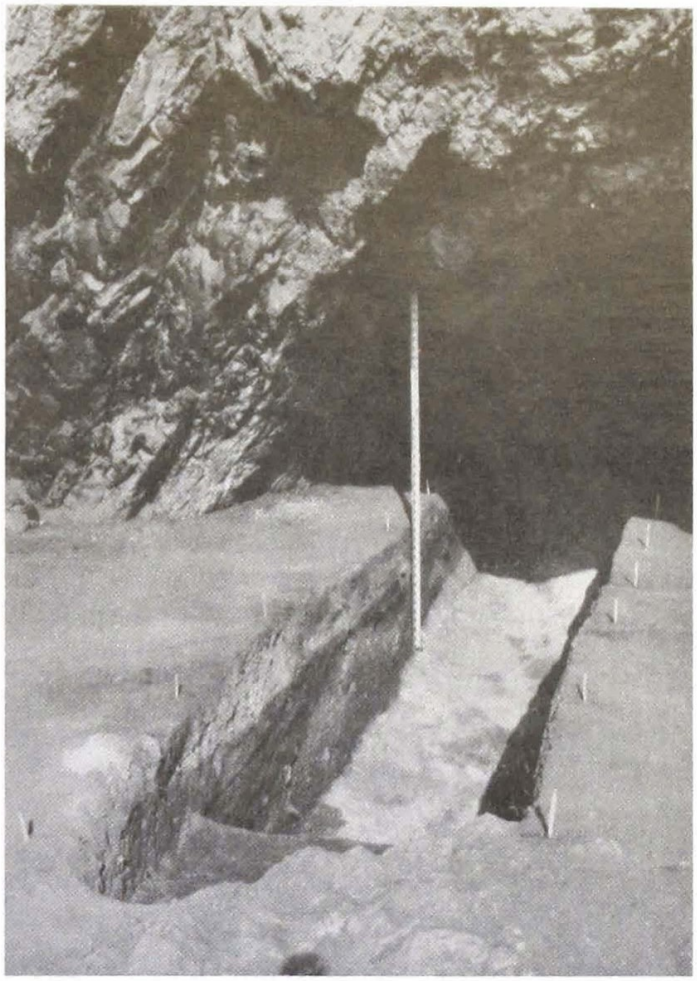


FIG. 13. Darra-i-Kur (Cave of the Valley): Trench I Stratigraphy. 1966. Roof fall in foreground ended Trench I. Floor plainly visible. Compare with Tentative Chronological Chart 5. Photo: Dupree.

yielded possible evidence of a two-phase Upper Palaeolithic. Note on figure 8 that the two layers of occupation gravels are separated by a sterile stratum of silts, between 12 and 08 on the stadia rod.

AK IV (Skull Cave) produced burials of approximately ten Later Iron Age individuals.[26] We have not definitely dated the graves as yet, but we recovered much grave furniture which points (at least tentatively) to about fifth-sixth centuries A.D. Among the items discovered in AK IV were: bronze bracelets, rings, projectile points, and an undecorated bronze mirror; iron points, a dagger, and horse trappings. Some jewelry was also found including lapis lazuli beads, carnelian beads and a silver ring with a lapis setting. The grave pottery was plain, except for two complete Red Streak-Pattern Burnished plates, identical to that first described from Shamshir Ghar,[27]

[26] The Iron Age skeletons are being studied by Dr. J. Lawrence Angel and his associates at the Smithsonian Institution for publication in the final monograph.

[27] Dupree, 1958: p. 202.

but also found at other sites in Afghanistan[28] (figs. 9, 10).

Two other items of archaeological interest should be mentioned in this preliminary report. We recorded literally thousands of petroglyphs in the Aq Kupruk area, which are being classified. Many are modern, but others, particularly dancing human figures covered with strings of travertine or calcite, may be of some antiquity. In a cave above Aq Kupruk I, several badly mutilated Buddhist paintings were found. The designs could not be reconstructed, but, hopefully, a technical analysis of the plaster on which the paintings were executed will give us hints as to their relationships with other sites.

BABA DARWESH

In the summer of 1966, excavations were undertaken at two caves in Badakhshan near Chenar-i-Baba Darwesh, a small village west of Kishm (36°44′ N, 69°59′ E.) (figs. 11, 12). The nearest village on the main road is Chenar-i-Gunjuskan. Darra-i-Kur (Cave of the Valley) proved frustrating for several reasons. The first trench, 2.5 meters wide and cut perpendicular to the cave wall, struck the cave floor at a depth of about one meter at the cave wall. The other end of the trench ran into a massive roof fall and the floor was only 2.5 meters below the lip of the trench, and Neolithic remains constituted the earliest finds (fig. 13). Another trench (II) was dug at a right angle to the first in an effort to get around the roof fall. This trench was 4 meters long, 2.5 meters wide, and reached the cave floor at about 2.5 meters (fig. 14).

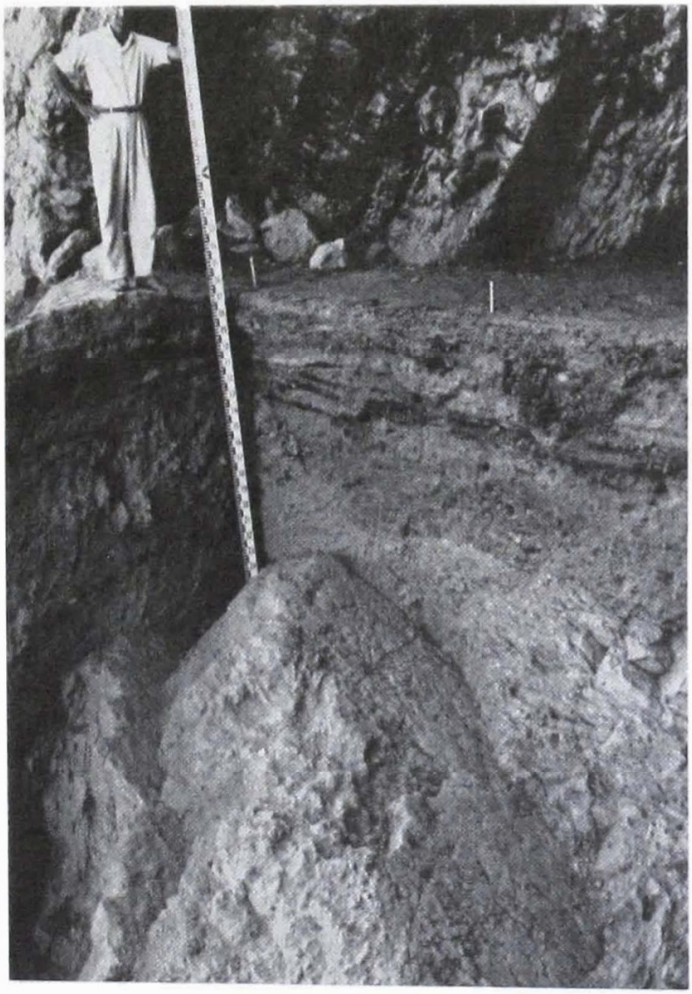


FIG. 14. Darra-i-Kur (Cave of the Valley): Trench II Stratigraphy. 1966. Compare with Tentative Chronological Chart 5. Photo: Dupree.

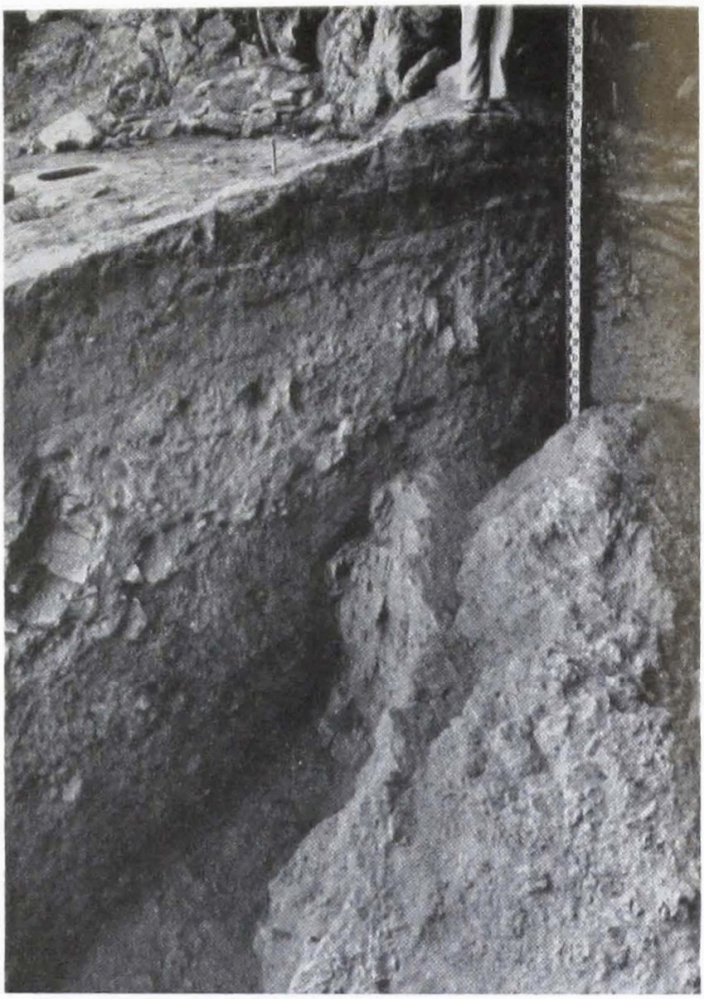


FIG. 15. Darra-i-Kur (Cave of the Valley): Trench III Stratigraphy. 1966. Compare with Tentative Chronological Chart 5. All the Mousterian occurred underneath the thick gravel layers and rock fall in the center of the profile. Photo: Dupree.

A third trench (III) was excavated perpendicular to the second (fig. 15). Trench III (2.5 meters wide and 24 meters long) went down into the talus slope past the disturbed roof fall to the older solution area which contains overbank sedimentation of silt and clay layers deposited when a stream was within about 7.5 meters (or almost 25 feet) of the cave.[29] The clays yielded fossil clam and crab remains. The periodic overbank floodings disturbed the various

[28] Gardin, 1957; Fischer, 1967.

[29] Personal communication; Lattman, 1969.

hearths and mixed up the charcoal in the overlying silts (fig. 16). The charcoal found in association with the Middle Palaeolithic flake implements and cores was dated 30,300 + 1900, − 1200 years B.P., by Geochron Laboratories, Inc., Cambridge, Massachusetts, with the comments:

Owing to insufficient charcoal, this sample was treated as a soil to recover enough organic carbon for dating. The entire sample was treated with cold dilute HCl to remove any carbonate material. The soil was then dried and roasted in oxygen to recover organic carbon for dating. The sample recovered was small but datable. You should be somewhat liberal in interpreting this date since the date was done on total carbon and some of this carbon *may* have had an origin other than charcoal flecks. Therefore, I would not hang any major decisions or interpretations upon this single date.[30]

FIG. 16. Darra-i-Kur (Cave of the Valley). Under major rock fall. Mohammad Ibrahim Khan standing on overbank deposits, Trench III. Mousterian skull fragment found near spot marked *x*. 1966. Photo: Dupree.

FIG. 17. Ghar-i-Hazar Gusfand (Cave of 1000 Sheep). General view. 1966. Photo: Dupree.

No undisturbed hearths were found in the Middle Palaeolithic levels. Probably all are now buried under the massive roof fall which occupies the entire central portion of the site (see *Tentative Chronological Chart* 5).

Another rock shelter, Hazar Gusfand (Cave of 1000 Sheep),[31] near Darra-i-Kur, was tested by Charles Kolb and Mohammad Ibrahim Khan, only to find a similar massive rock fall at depths between 2–3 meters (fig. 17). Little evidence of occupation earlier than Kushan was found. The rock falls may have been caused by earthquakes, still common in northern Afghanistan. Several hundred shocks of varying intensity are recorded each year.

[30] Report from Harold W. Krueger, Technical Director, Geochron.

[31] Refers to the number of nomadic sheep the shelter will hold.

THE LITHIC AND BONE SPECIMENS FROM AQ KUPRUK AND DARRA-I-KUR

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and

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The stone implements from the Upper Palaeolithic and Neolithic at Aq Kupruk were made from a superb homogeneous nodular flint found locally in great quantities. In contrast, the stone implements of the Mousterian of Darra-i-Kur were manufactured from locally available blackish and yellowish stones, a type of poor quality flint as yet unidentified mineralogically. The "Goat Cult" Neolithic of Darra-i-Kur, however, contained several blades made from an excellent flint, none of which has yet been found locally except in the excavations.

In both areas and in all levels, there is a surprising lack of worked bone, with maximum occurrence, however, in the "Goat Cult" Neolithic, chronologically much later in time than the various Neolithic levels at Aq Kupruk I and II.

UPPER PALAEOLITHIC: AQ KUPRUK I, II, III

Two possible phases of Upper Palaeolithic flint blade and flake plus microcomplex (Kuprukian A and B) exist at AK II and III. At AK III (open-air site), a waterlaid deposit separated the two phases. Only a single phase occurred at AK I. Actually, so little difference appears to exist (at this phase of our studies) that we may eventually be justified in lumping the two phases together, but this will only be possible after Davis completes his extensive statistical study of the material.

We have, for the sake of convenience and the purposes of this preliminary report, divided the lithic specimens at the Aq Kupruk sites into the following categories (all sketch scales in cm.):

Blade-Flake Components
- Débitage
- Cores
- Flakes and Blades: Utilized and Retouched
- Scrapers
- Burins
- Core Rejuvenating Flakes and *Lames à crête*

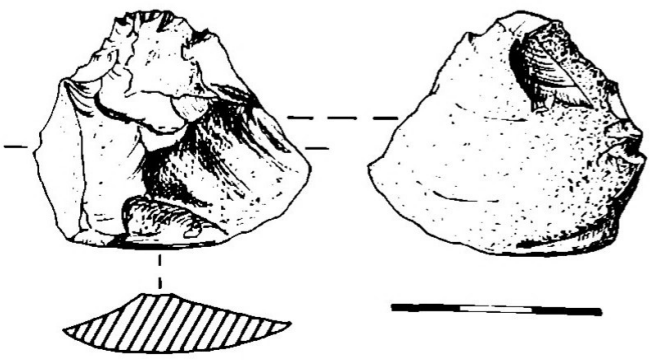


FIG. 18. Débitage. Kuprukian.

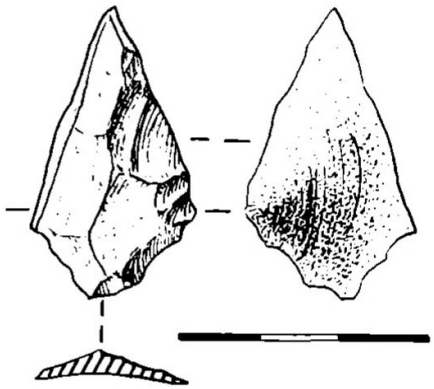


FIG. 19. Débitage. Kuprukian.

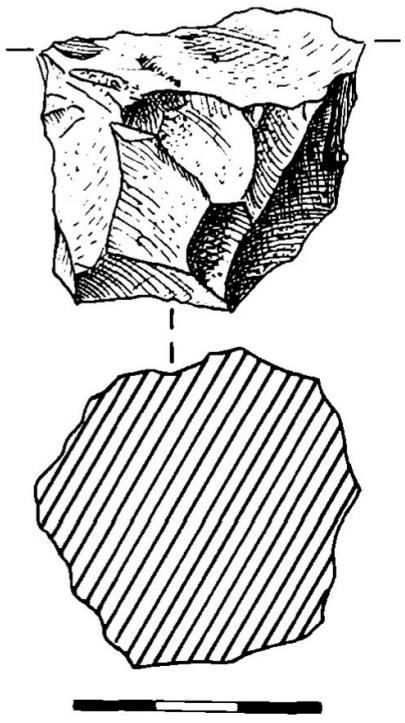


FIG. 20. Single platform core. Kuprukian.

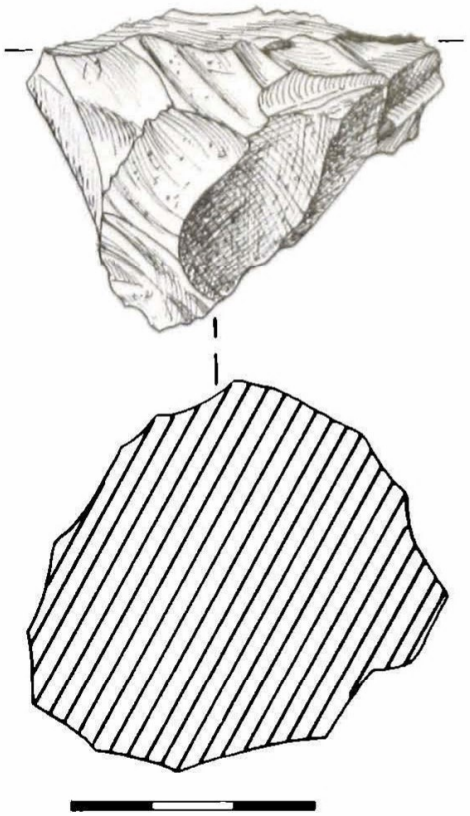


FIG. 21. Multiple platform core. Kuprukian.

Micro-Components
Microblade Cores and Bladelets
Bladelets: Utilized and Retouched
Points

Utilized Pebbles and Pebble Tools

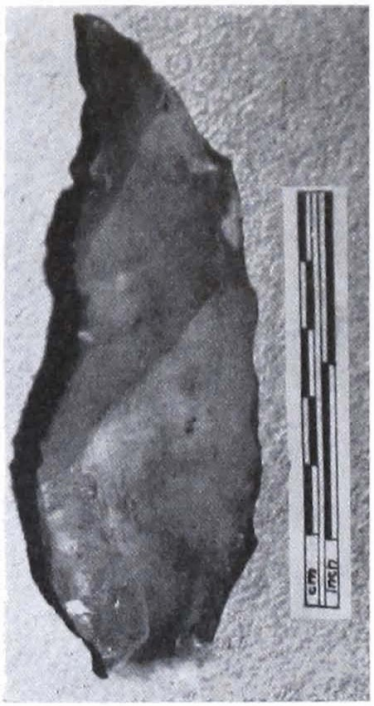


FIG. 22. Retouched flake. Kuprukian. Photo: Klappert.

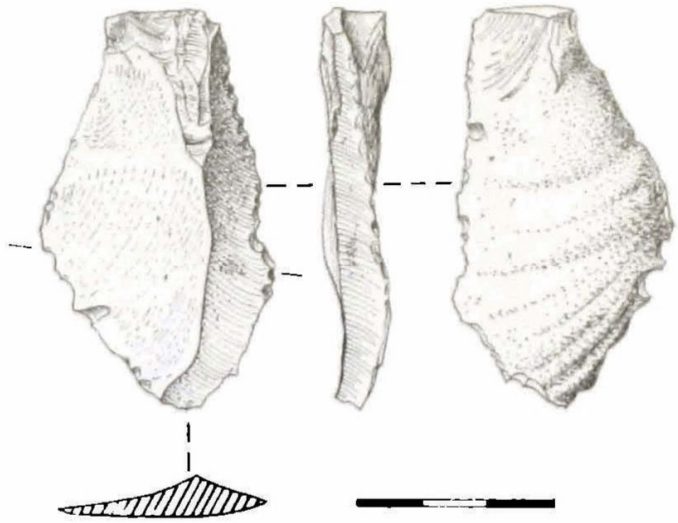


FIG. 23. Retouched flake. Kuprukian.

BLADE-FLAKE COMPONENT

Débitage (figs. 18, 19). The overwhelming majority of struck, unmodified core products are primary flakes, characterized by an irregular outline, non-faceted striking platforms, a striking platform angle of approximately 90° and well-developed bulbs of percussion. The approximate average length of unbroken flakes is between 3 and 4 cm. Broken flakes (defined here as missing striking platforms) and unbroken flakes occur in an approximate ratio of 3 to 2, respectively. Unmodified flakes constitute about 90 per cent of the entire lithic industry (excluding river pebbles). Such a high percentage probably indicates that most of the tools in the Aq Kupruk sites were manufactured on the spot.

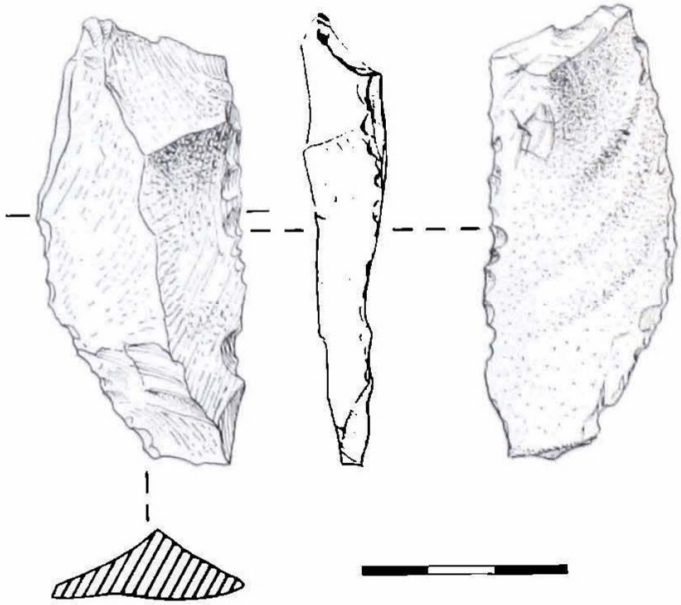


FIG. 24. Retouched flake. Kuprukian.

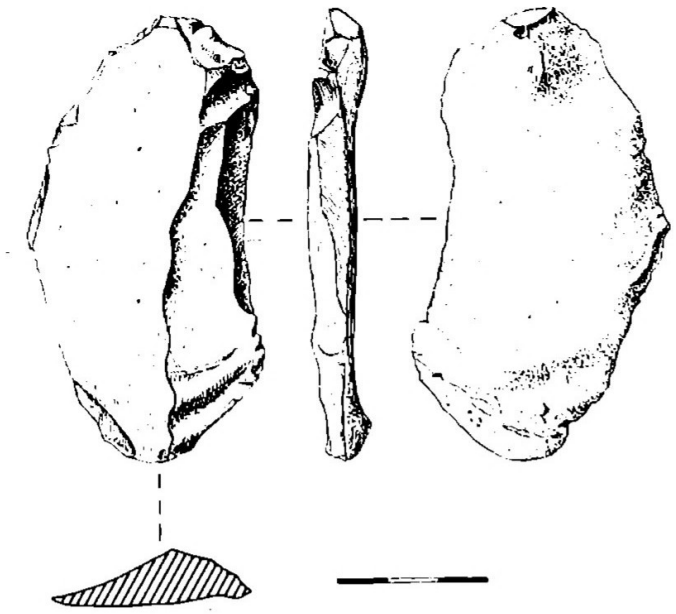


FIG. 25. Primary flake. Kuprukian.

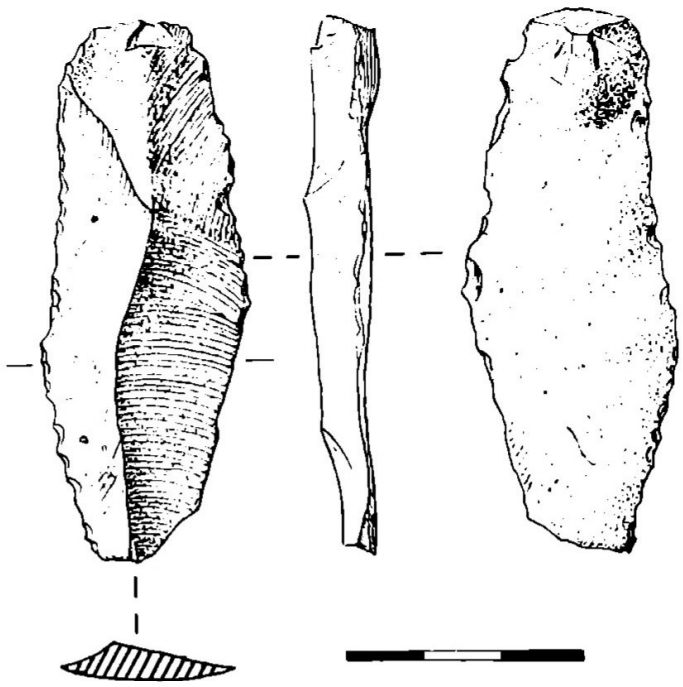


FIG. 27. Utilized blade. Kuprukian.

Retouch flakes, usually small and thin (average length about 0.7 cm.), had no regular dorsal flake scars. Often, retouch flakes have very small striking platforms and are sometimes curved longitudinally. Some of the objects classified as retouch flakes may ultimately be simply called "core products," for at times the two are virtually indistinguishable.

Irregular débitage products appear, but with less frequency as the tool manufacturers improved their technique through time. These amorphous fragments of flint, created by misdirected core blows or impurities in the flint which precluded a concoidal fracture, have approximately equal width, length, and thickness, and give further evidence that the tools were manufactured *en locale*. Cortex appears on the surface of many of these irregular fragments. Few had bulbs of percussion or exhibited snapped truncations.

Core fragments (remnants of cores struck from several directions) often had snapped truncations which eliminated the striking platforms. All, however, had concave flake removal surfaces.

Cores. Cores, exclusive of microcores, are currently classified as: single platform (fig. 20); double platform; multiple platform (fig. 21). The three types occurred in almost equal proportions, and only a few showed signs of exhaustion. Possibly the abundance of excellent raw flint in the Aq Kupruk area made careful flake core preparation unnecessary. Few really good, regular blade cores were found.

Flakes and Blades: Utilized and Retouched. More retouched flakes than blades exist in the Kuprukian.

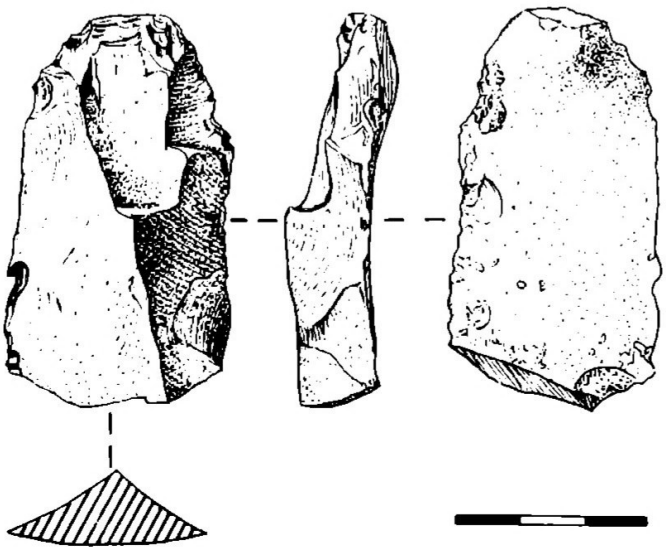


FIG. 26. Utilized flake. Kuprukian.

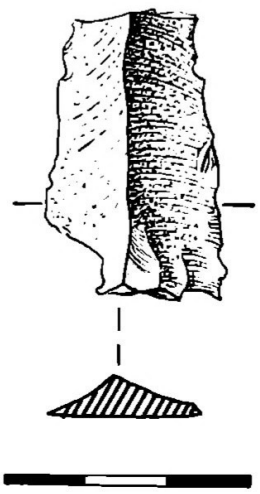


FIG. 28. Utilized blade. Kuprukian.

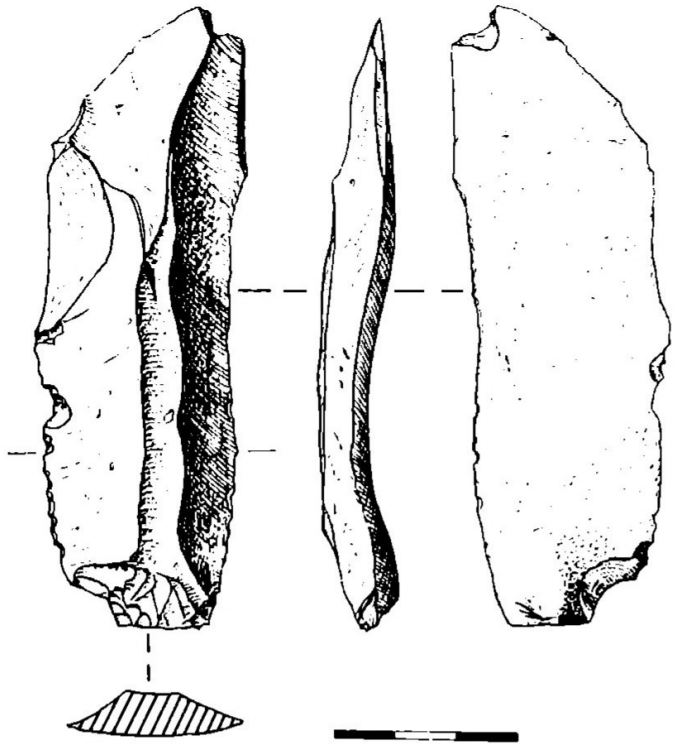


FIG. 29. Utilized blade. Kuprukian.

Unlike the scrapers, the retouched flakes and blades do not conform to a general pattern. Both fine and heavy retouch occurred,[32] with over two-thirds showing fine retouch. In addition to length, width and thickness, the following five attributes are being considered in the study of the retouched material: lateral or transverse retouching; continuous or partial retouching along an edge; dorsal or ventral retouching; flake or blade blanks; contour-straight, concave or convex.

Specimens were usually straight, with either ventral or dorsal (both occurred in almost equal proportions)

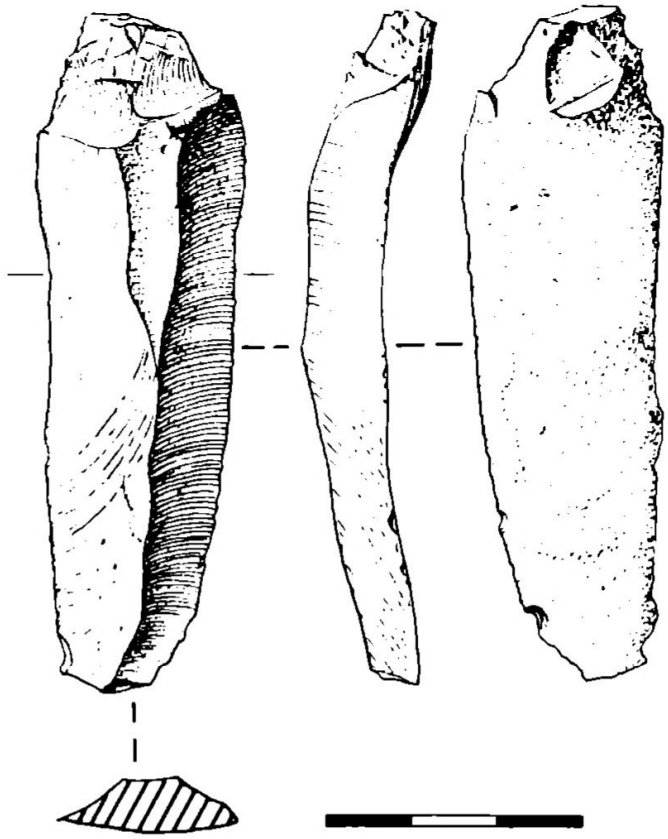


FIG. 31. Utilized blade. Kuprukian.

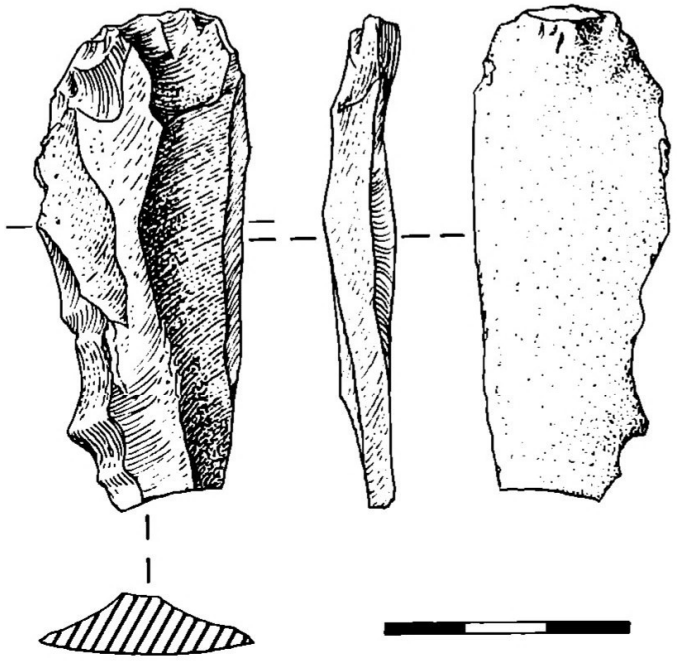


FIG. 30. Utilized blade. Kuprukian.

[32] See Movius, *et al.*, 1968: p. 6, for definitions.

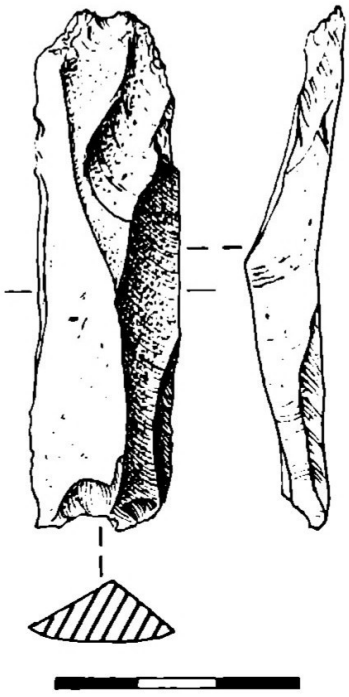


FIG. 32. Utilized blade. Kuprukian.

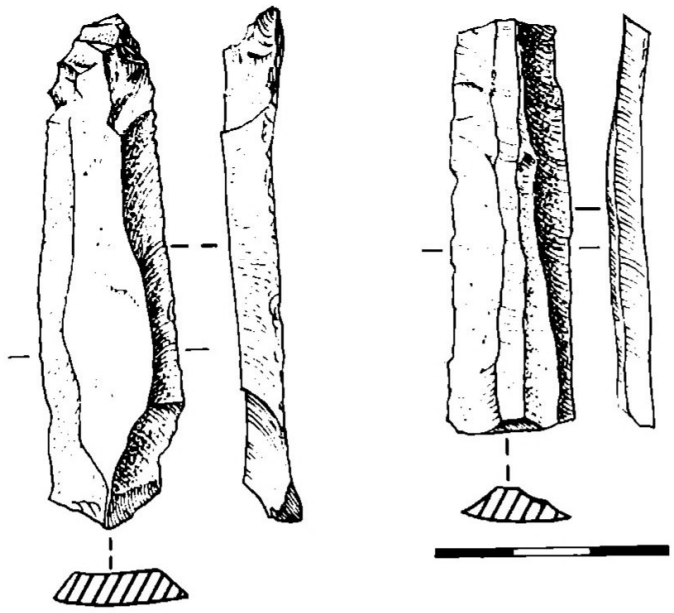


FIG. 33. Utilized blade. Kuprukian.
FIG. 34. Utilized blade. Kuprukian.

continuous retouch common along one lateral side. Seldom did the retouching drastically alter the original blank outline. Rather, the retouch tended to straighten out or evenly curve the edge (fig. 22). Retouched flakes averaged about 3.5 cm. in length, and the angle of retouch, usually acute, averaged about 30°; therefore, most utilized and retouched flakes were probably used as cutting tools (figs. 23–26).

Blades, defined as having the length exceed the width by a ratio of 2 to 1 (or more), had roughly parallel or slightly convergent sides (figs. 27–34). Kuprukian blades reached lengths up to 10 cm. The

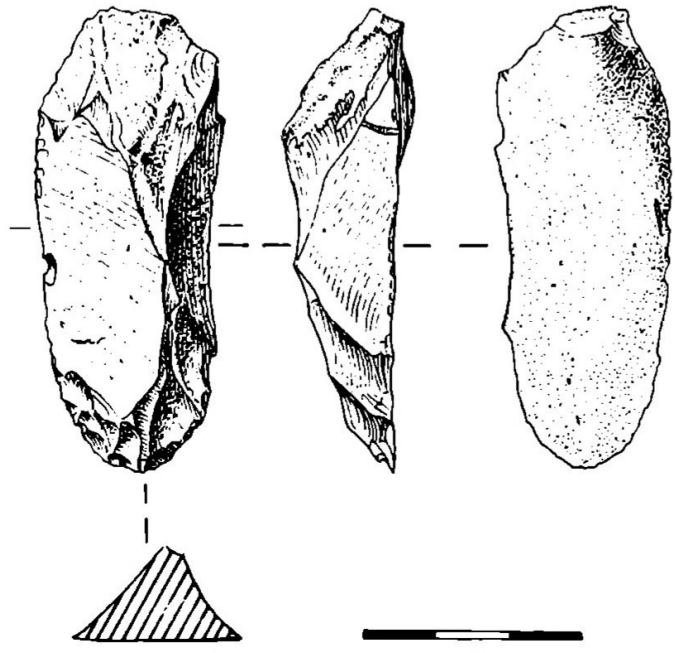


FIG. 35. End scraper on blade. Kuprukian.

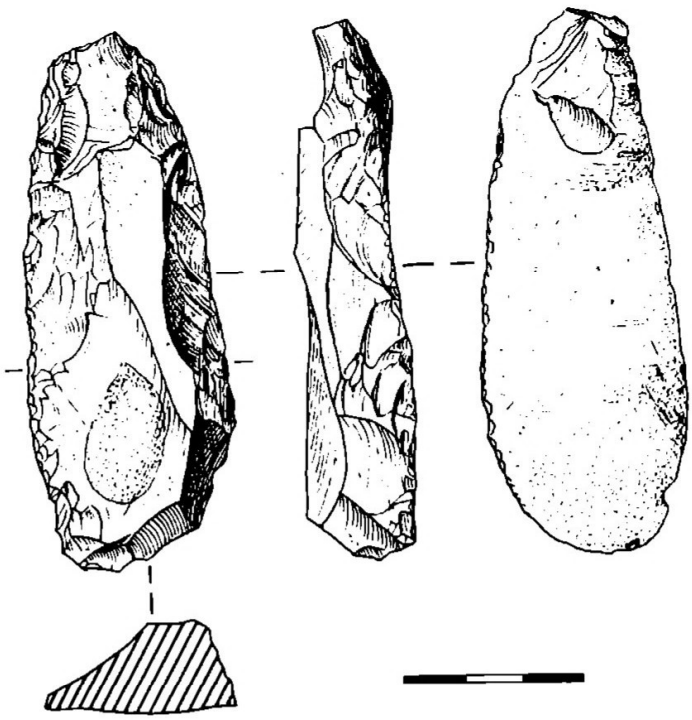


FIG. 36. Carinated end scraper. Kuprukian.

technique of manufacture of the blades (although few in number relative to the flake specimens[33]) by either direct or indirect percussion is unknown, but Davis

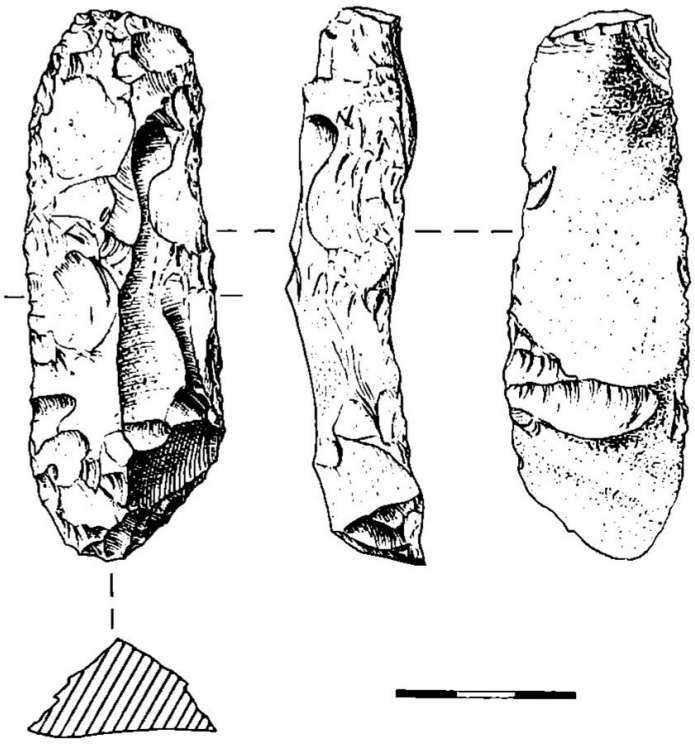


FIG. 37. Carinated end scraper. Kuprukian.

[33] Although the Upper Palaeolithic is commonly regarded as a "blade culture," there are some stages of it in which flakes exist in higher percentages than blades, e.g., the Aurignacian. (de Sonneville-Bordes in Caldwell, ed., *New Roads to Yesterday* [1966], p. 180). The Kuprukian is certainly one of these stages.

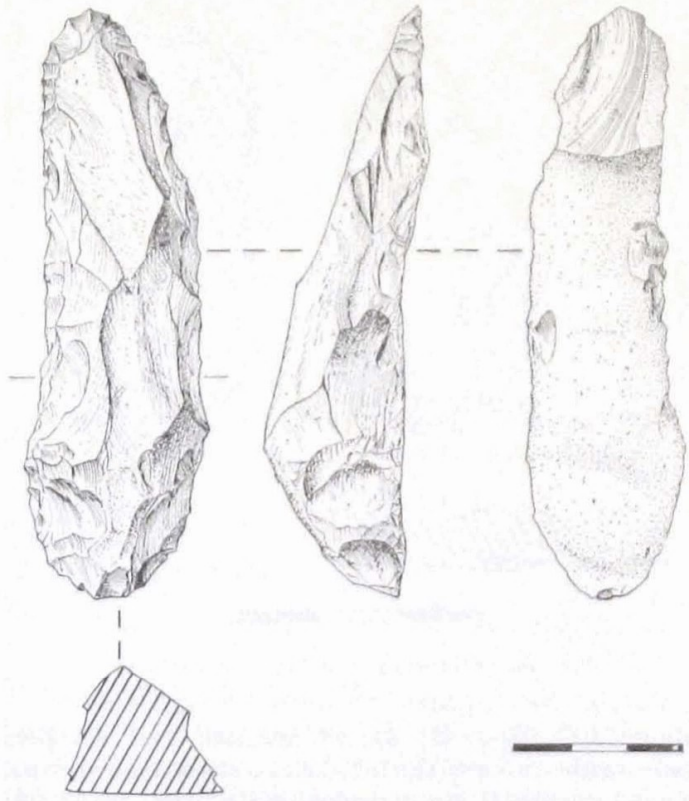


FIG. 38. Carinated end scraper (stepped). Kuprukian.

plans further experiments in order to answer this question.

Scrapers. Outside the utilized and retouched flakes and blades, end scrapers constituted the major tool type. Two general types occurred: carinated, steep-retouched with retouch angles of about 60°; end scrapers on flakes or blades with flat retouching of

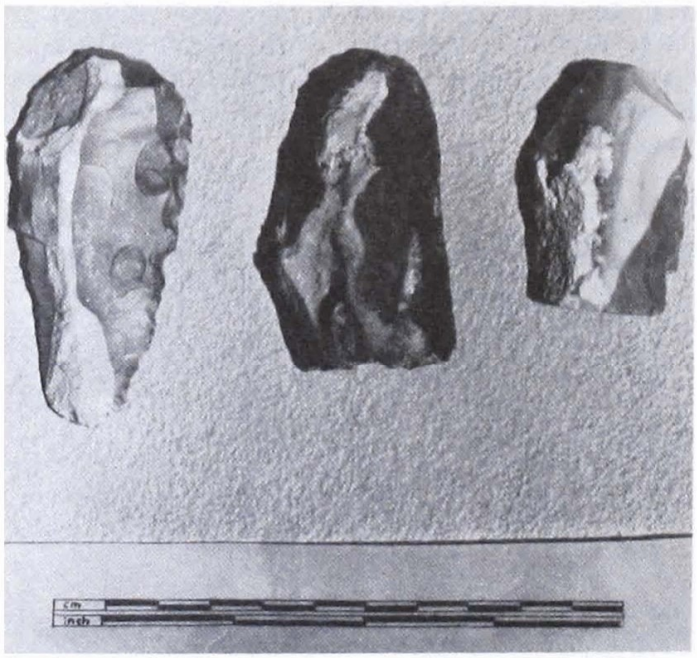


FIG. 39. Carinated end scrapers. Kuprukian. Photo: Klappert.

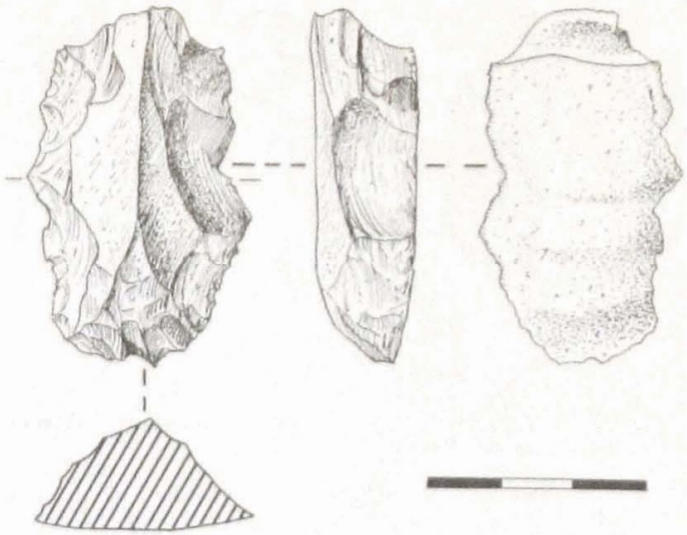


FIG. 40. Denticulate-carinated end scraper. Kuprukian.

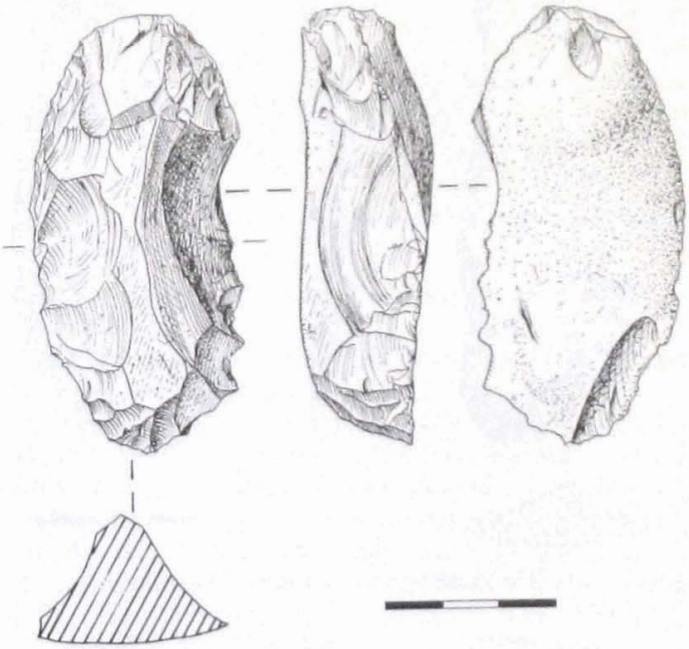


FIG. 41. Denticulate-carinated end scraper. Kuprukian.

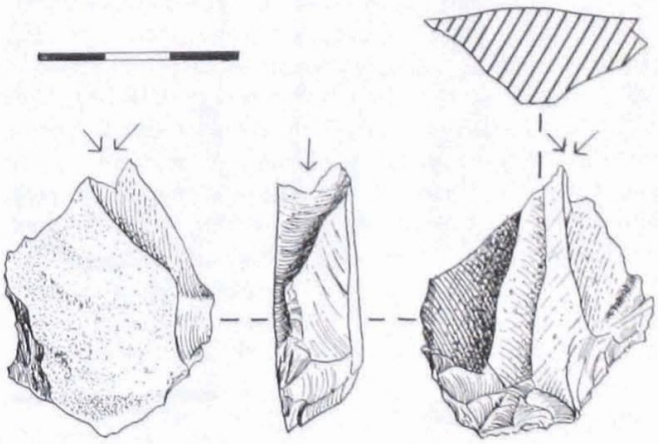


FIG. 42. Carinated end scraper-burin. Kuprukian.

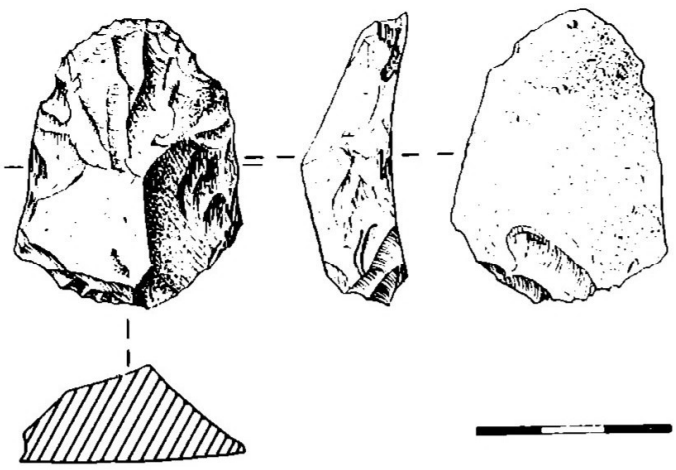


FIG. 43. Nosed scraper. Kuprukian.

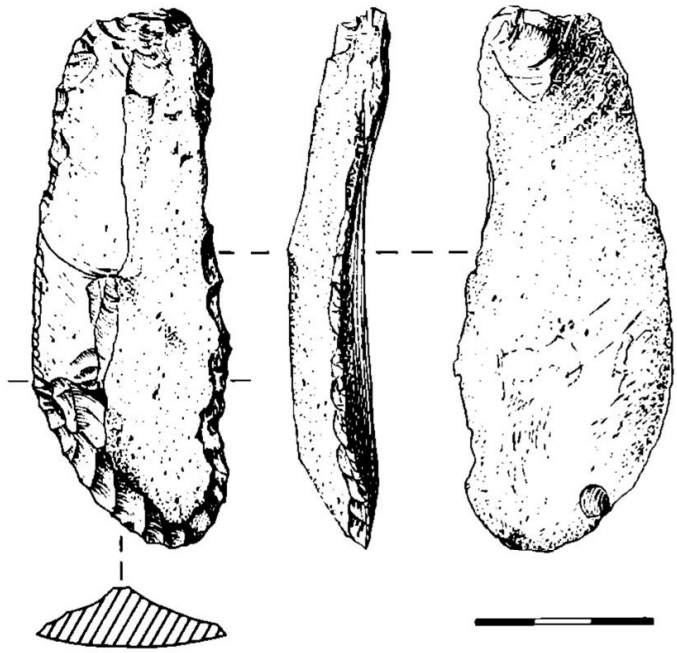


FIG. 44. End scraper on blade. Kuprukian.

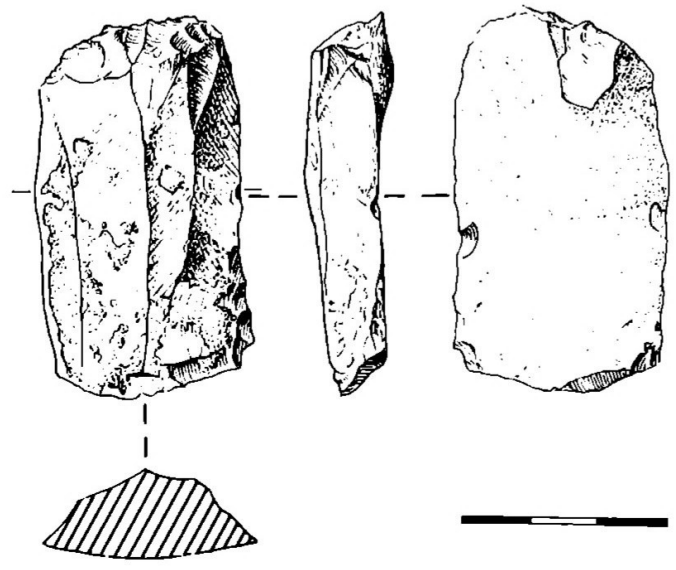


FIG. 45. End scraper on flake. Kuprukian.

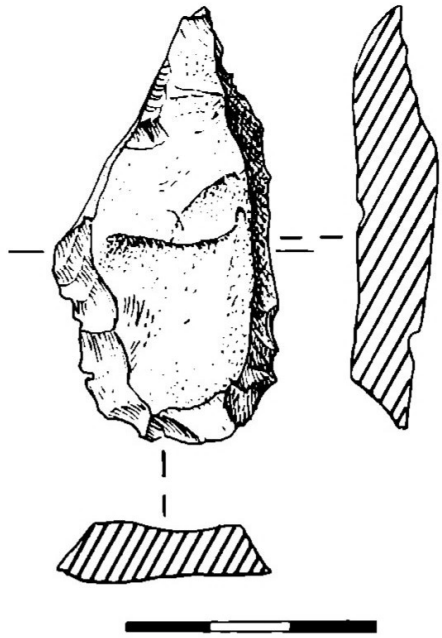


FIG. 46. End scraper on flake. Kuprukian.

about 30° (figs. 35, 44). Carinated end scrapers were made on very thick flakes or short blades, with semi-convergent, steep retouching at the distal end (fig. 39). The ventral views generally show symmetrical convexity, although a few are assymmetrical (figs. 36–37). Several carinated end scrapers have stepped (Aurignacian-type) retouching all around their circumferences. Removals are generally large, particularly along the lateral borders of the blanks (fig. 38). Some aberrant end scraper specimens have rough outlines, lacking continuous, smooth curvature. Those end scrapers with smooth contours generally have secondary fine retouching which eliminates the irregularities caused by the larger removals (figs. 37, 38). Since such retouching could be easily performed on the homogeneous Kuprukian flint, it is strange that many specimens have rough outlines, thus reducing their efficiency as scrapers.

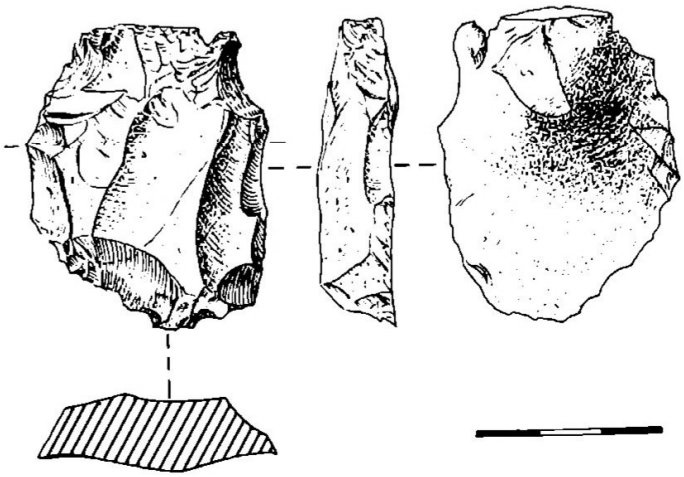


FIG. 47. End scraper on flake. Kuprukian.

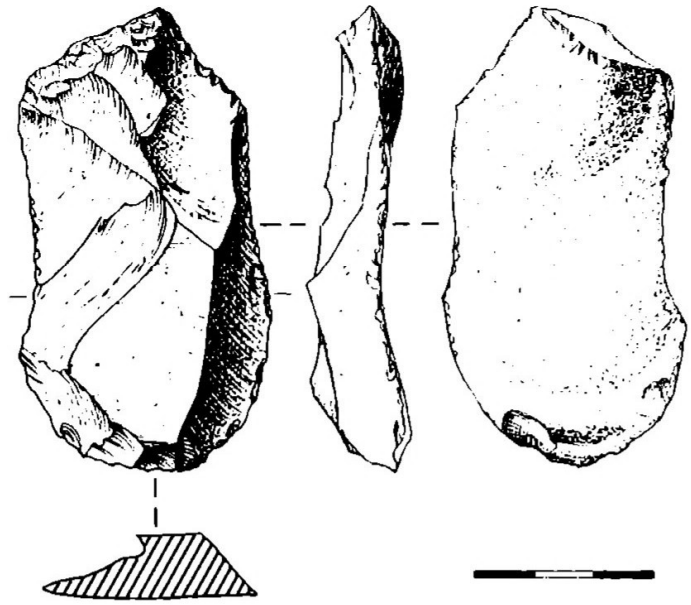


FIG. 48. Double-ended scraper on flake. Kuprukian.

Some scrapers have been denticulated by lateral retouch, and should be classified as denticulate-carinated end scrapers, a rare palaeolithic type (figs. 40, 41). In addition, a number of the carinated end scrapers are broken at the proximal end and the bulbar portions are absent. The breaks may be described as snapped truncations, for most have a hinge fracture. We do not know, at the present stage of research, whether the breakage was accidental, occurring during manufacture or actual use, or whether it was done on purpose. An interesting possibility is that the denticulate-carinated end scrapers and the carinated end scrapers with snapped truncations may represent a stage in the preparation of microcore blanks, but substantiation must await further experimentation.

Another common type of carinated end scraper had two intersecting flakes removed at the proximal end (fig. 42). The reason for the removal is unknown,

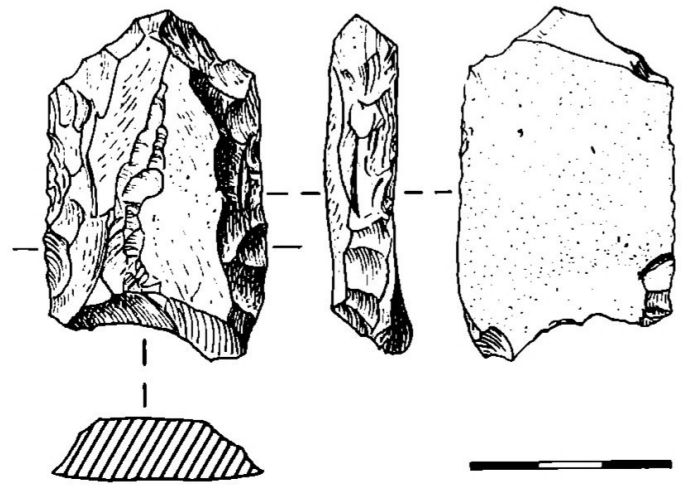


FIG. 49. End scraper with lateral retouch on flake. Kuprukian.

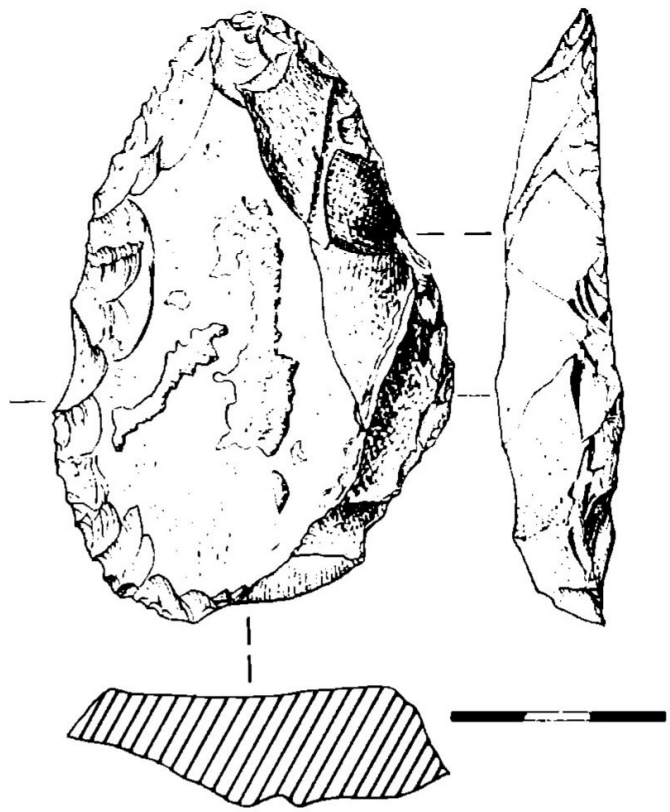


FIG. 50. Ovoid end scraper with lateral retouch. Kuprukian.

but possibly the end result could have been used as a burin.

Several nosed scrapers (fig. 43), variants of the carinated types, were found.

End scrapers on blades (fig. 44) and flakes (figs. 45–47) are also common. Some are double ended (fig. 48). Most have symmetrical contours, but asymmetrical specimens do occur. Retouch usually appears only on the distal end, and some have lateral retouch, similar to that on some carinated end scrapers (fig. 49). The end scrapers on blades and flakes are heavily retouched.[34]

One large ovoid, finely retouched specimen, is reminiscent of the Mousterian (fig. 50).

Several combination end scraper-burins on blades (fig. 51), and flakes (figs. 52, 53) were found.

Burins. Most Kuprukian burins are of the dihedral type and are on the distal end of flake-blades. Only a very small number of burins on retouched truncations occurred. The only other numerous burin type is *burin d'angle sur cassure* (snapped angle burin),[35] with a burin angle of approximately 90°, with no more than two blows struck from the snapped-truncated spall removal surface (fig. 54).

The dihedral burins may be classified as either *burin dièdre droit* (straight) or *déjeté*.[36] Usually, one

[34] Terminology of Movius, *et al.*, *op. cit.*

[35] Sonneville-Bordes and J. Perrot, 1956: p. 408.

[36] *Ibid.*, p. 408.

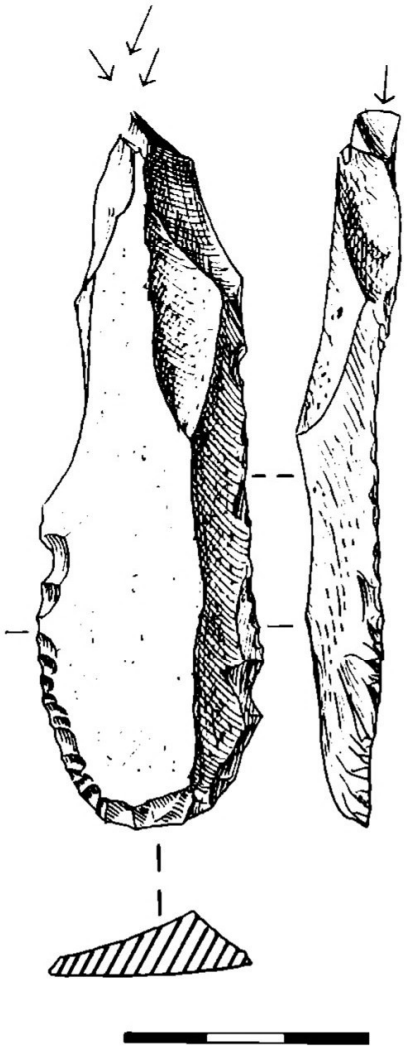


FIG. 51. End scraper-burin on a blade. Kuprukian.

or two burin blows were made to form each burin facet, and the burin edges are either straight or beveled (figs. 55–57).

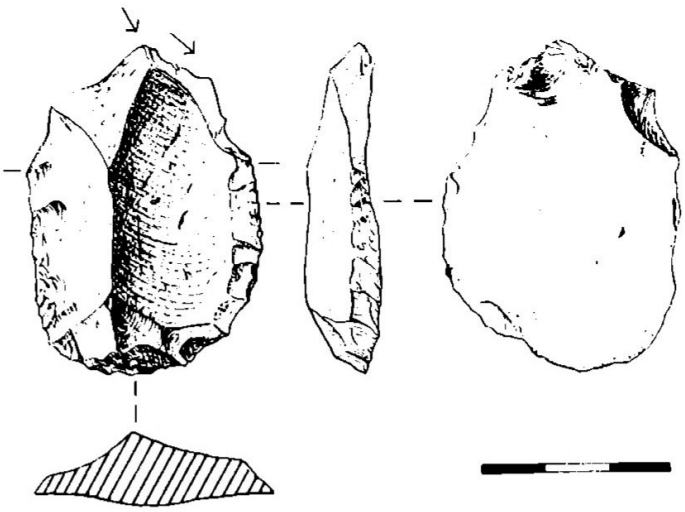


FIG. 53. End scraper-burin on a flake. Kuprukian.

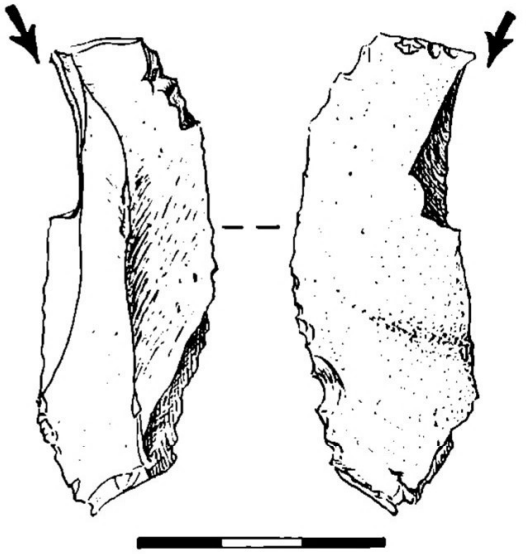


FIG. 54. Burin d'angle sur cassure. Kuprukian.

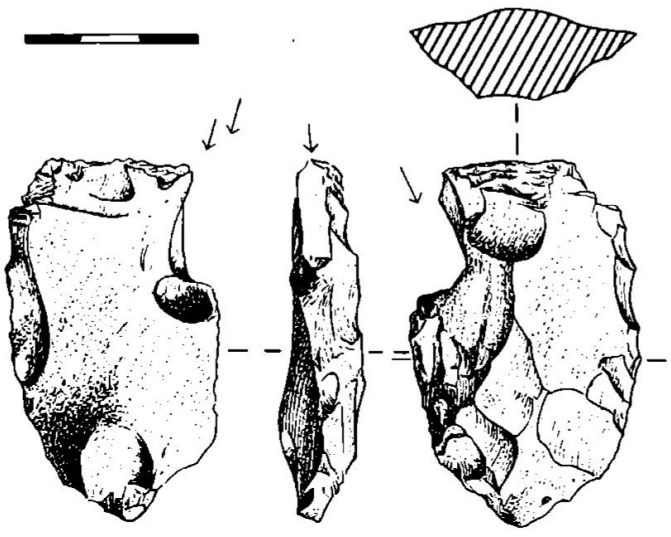


FIG. 52. End scraper-burin on a flake. Kuprukian.

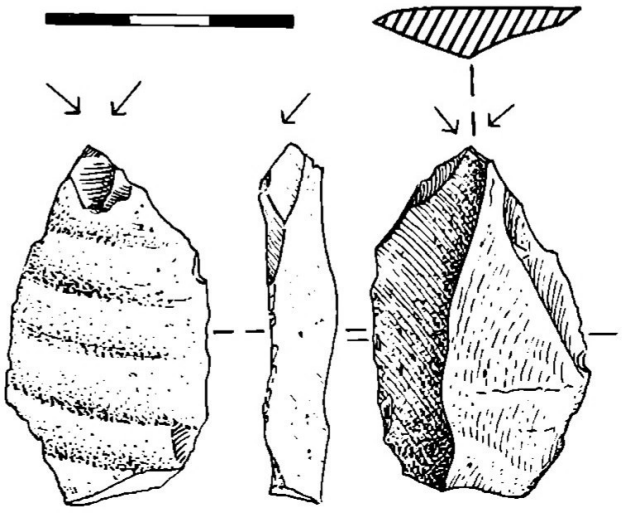


FIG. 55. Straight dihedral burin. Kuprukian.

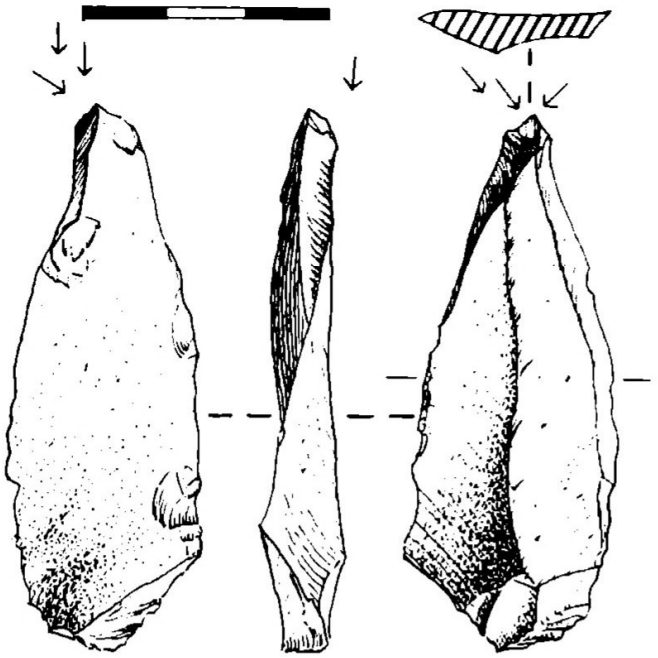


FIG. 56. Déjeté dihedral burin. Kuprukian.

An interesting type of rare burin is the burin made on a natural facet, formed on the distal end of a flake as it is struck off a core. To qualify as a burin, however, a genuine burin blow must also be executed to complete the implement.

The limited variety of Kuprukian burin types fits into the pattern of late Upper Palaeolithic industries in the Middle East and elsewhere.[37]

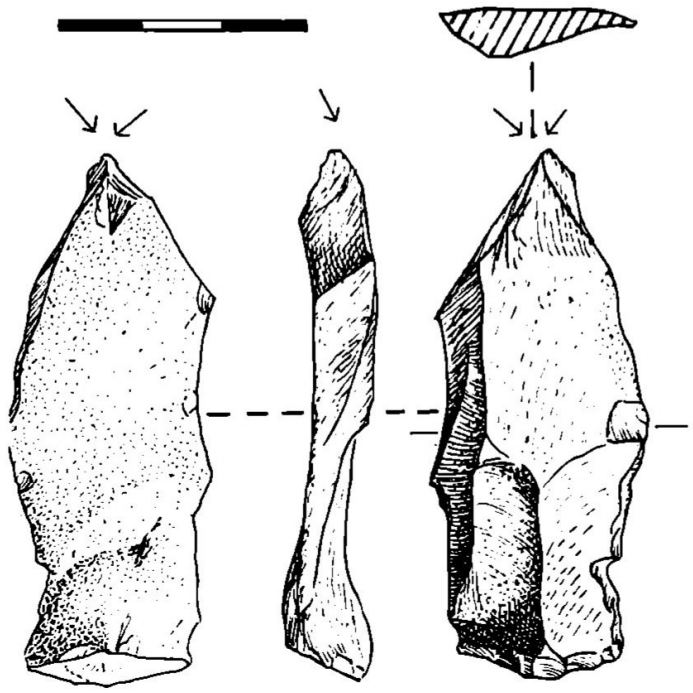


FIG. 57. Straight dihedral burin. Kuprukian.

[37] Hole and Flannery (1967: p. 152) observed a decline in the number and variety of burins in the Zarzian sites of western Iran.

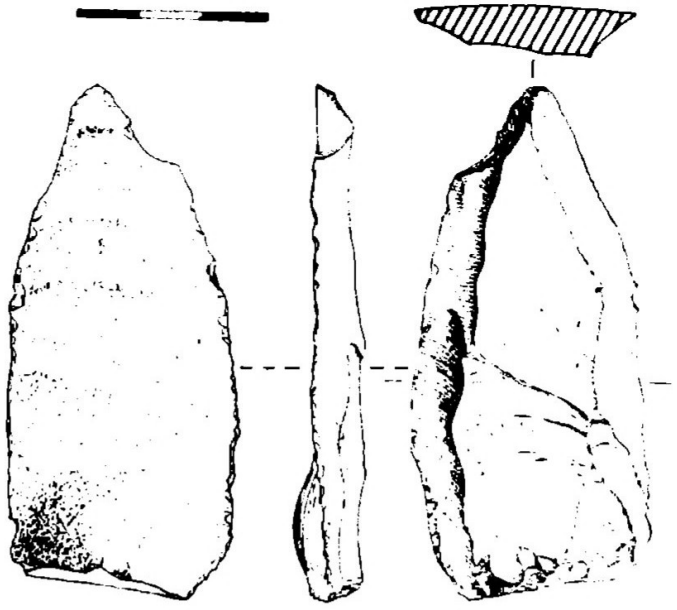


FIG. 58. Point. Kuprukian.

Points. A limited number of flint points occurred in the Kuprukian. Most points were of a "pseudo-Levallois" type (fig. 58), but one shouldered point (fig. 59) was found at Aq Kupruk I.

Core Rejuvenating Flakes and Lames à crête. A relatively small number of tabular flakes and core rejuvenating flakes (*lames à crête*), characterized by thick edges with flake or blade scars perpendicular to the flake surface were found. The more numerous *lames à crête* had thick triangular cross sections and flake or blade removal scars on the dorsal sides perpendicular to the long axes and intersecting the ventral surfaces (figs. 60, 61).

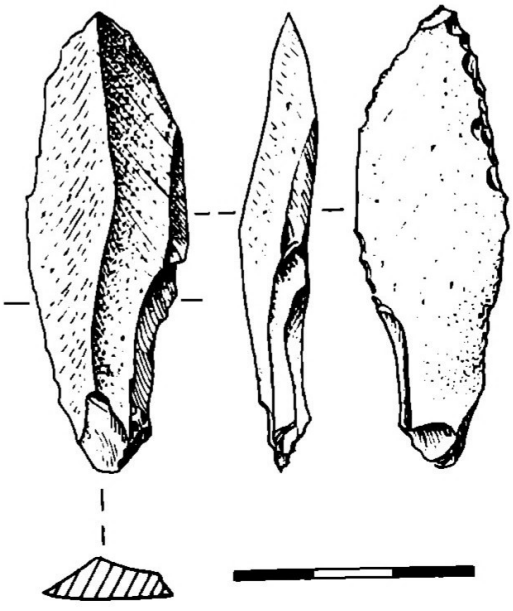


FIG. 59. Shouldered point. Kuprukian.

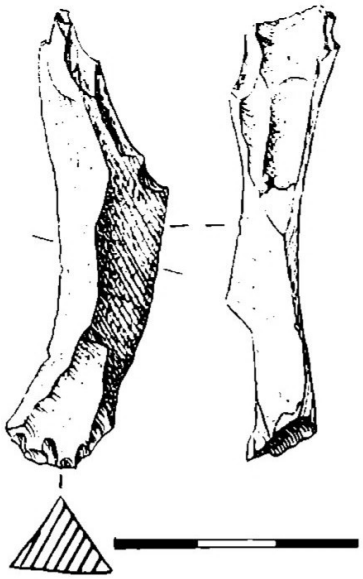


FIG. 60. Lame à crête. Kuprukian.

MICRO-COMPONENT

An important negative feature of the micro-component was the total lack of anything resembling a geometric implement type.

Microblade Cores and Bladelets (figs. 62–68). The numerous Kuprukian microblade cores show high technical skill, and in their precision rival the prismatic obsidian blade cores of Mesoamerica.[38] Similar cores have been found in Soviet Central Asia and western Iran but in Neolithic contexts. The microblades were removed by a pressure technique that must have required a crutch flaker like those used in Mesoamerica as described by Crabtree.[39] The technical ability of the Kuprukian craftsmen is reflected by the small diameters observed in many of the cores (0.3–0.5 cm.) An extremely steady vise and controlled execution was required for such an end product. The blade removal surfaces were only slightly convex which indicates the microblades had flat, longitudinal profiles and had evenly spaced blade scars (only 0.2–0.4 cm.) around the entire circumference.

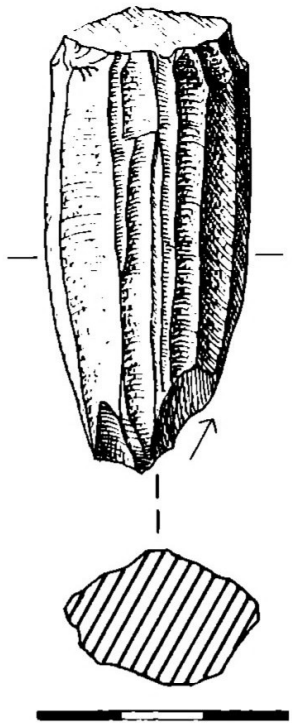


FIG. 62. Microblade core. Kuprukian.

Pressure platforms were circular and slightly concave, a necessary feature of repeated, accurate blade removal. A single flake was removed to form the pressure platform. A large portion of the microcores

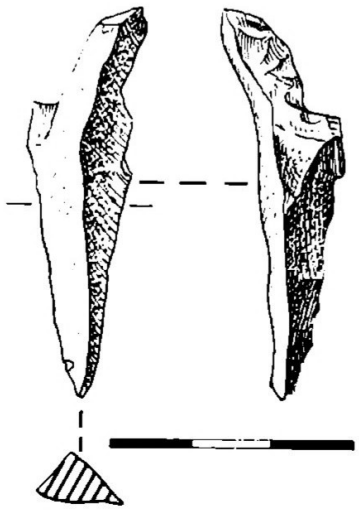


FIG. 61. Lame à crête. Kuprukian.

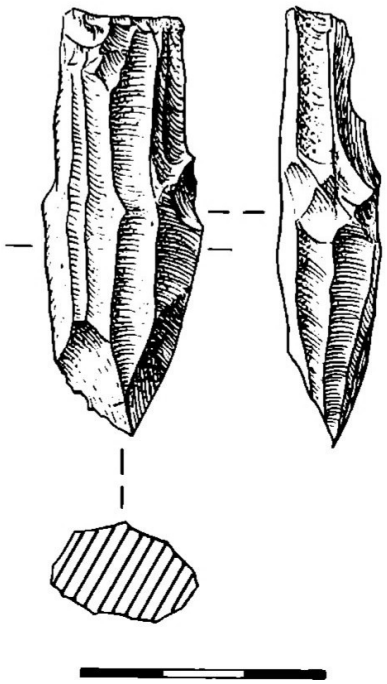


FIG. 63. Microblade core. Kuprukian.

[38] Crabtree, 1970.
[39] Crabtree, 1968.

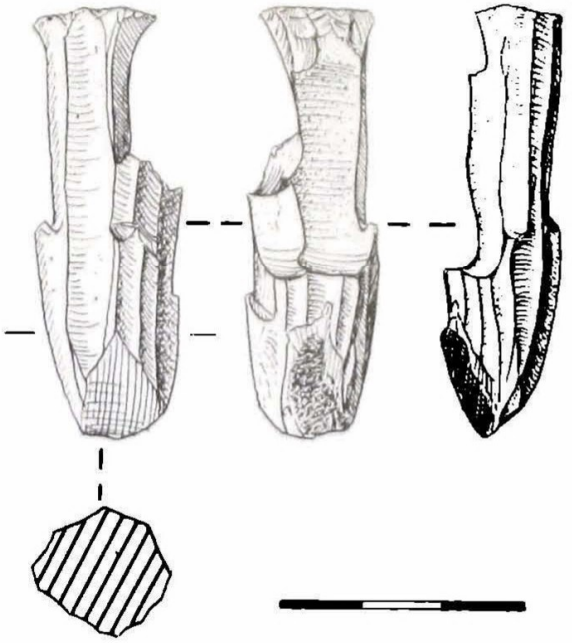


FIG. 64. Microblade core. Kuprukian.

showed distal counterblows which were made during the fabrication of the core blank, prior to the removal of the narrow microblades. These distal blows formed a wedge-shaped tip to the microcore and may have facilitated the removal of the microblades. It is also possible that the microcore itself was used as a tool and the tip had some functional purpose. The overall length of the microcores did not exceed 5 cm. It is likely that it is not possible to produce consistantly microblades that are 0.4–0.6 cm. wide and greater than 5 cm. long.

Several microblade cores had been misstruck, the most common error probably being a lack of sufficient

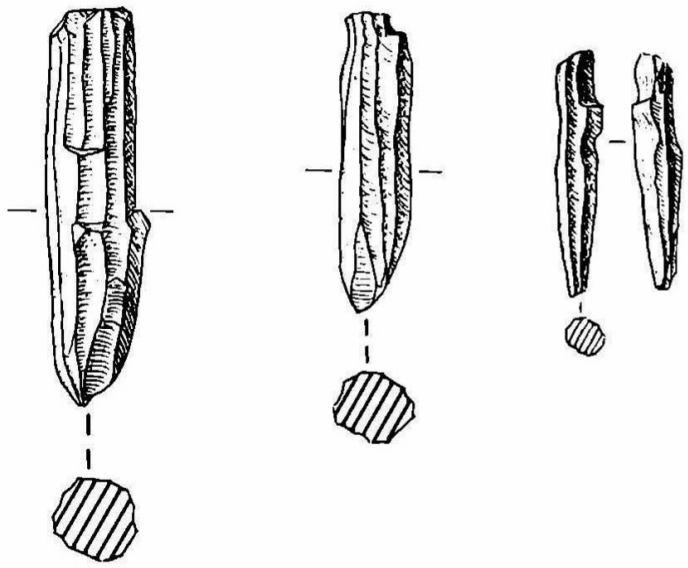


FIG. 65. Microblade core. Kuprukian.
FIG. 66. Microblade core. Kuprukian.
FIG. 67. Microblade core. Kuprukian.
Scale 1/1.

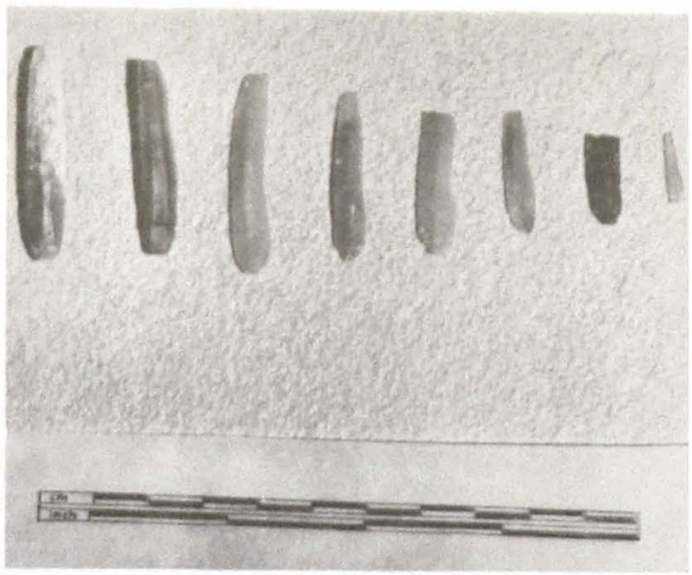


FIG. 68. Microblades. Kuprukian. Photo: Klappert.

pressure at the moment of blade removal, resulting in a terminal outward hinge fracture (fig. 64). Too much force will cause a portion of the distal end of the core to be carried away with the blade. It is evident from the large percentage of nearly exhausted microblade cores which exhibit perfect regularity, however, that the inhabitants of Aq Kupruk I, II, and III had mastered the microtechnique. (See fig. 85). Because of the perfection of the work it is possible that the microcomponents were made by a few part-time specialists.

Another peculiarity occurred. Some microcores had whitened distal ends, often the discoloration extended half way up the body of the core. The cause is as yet undetermined, but may relate in some way to heat exposure.

Bladelets: Utilized and Retouched. Kuprukian bladelets (or microblades) constitute the largest single non-débitage type and are identified on the basis of the following characteristics: width, length, presence

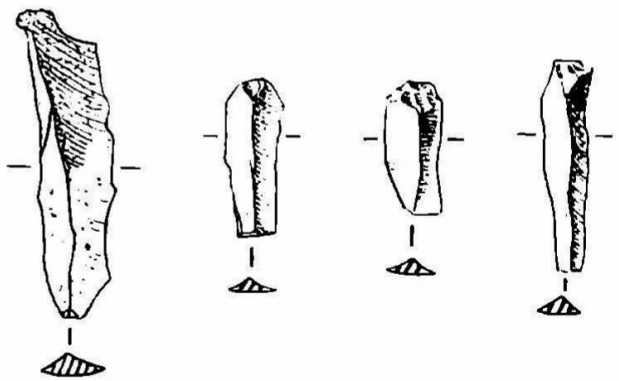


FIG. 69. Bladelet (microblade). Kuprukian.
FIG. 70. Bladelet (microblade). Kuprukian.
FIG. 71. Bladelet (microblade). Kuprukian.
FIG. 72. Bladelet (microblade). Kuprukian.
Scale 1/1.

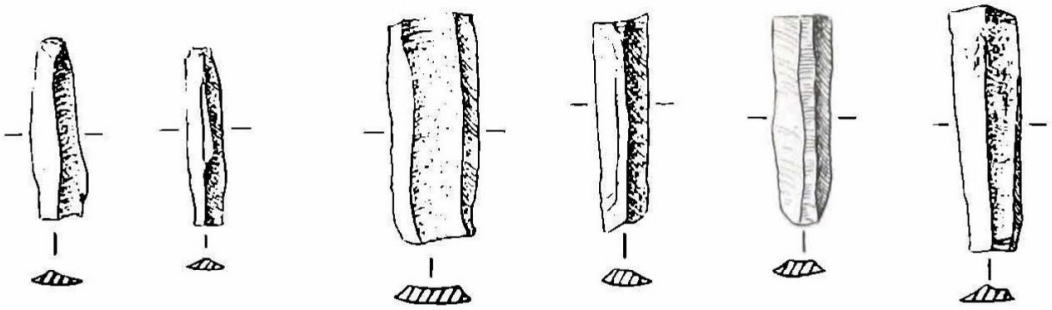


FIG. 73. Bladelet (microblade). Kuprukian.
FIG. 74. Bladelet (microblade). Kuprukian.
FIG. 75. Bladelet (microblade). Kuprukian.
FIG. 76. Bladelet (microblade). Kuprukian.
FIG. 77. Bladelet (microblade). Kuprukian.
FIG. 78. Bladelet (microblade). Kuprukian.
Scale 1/1.

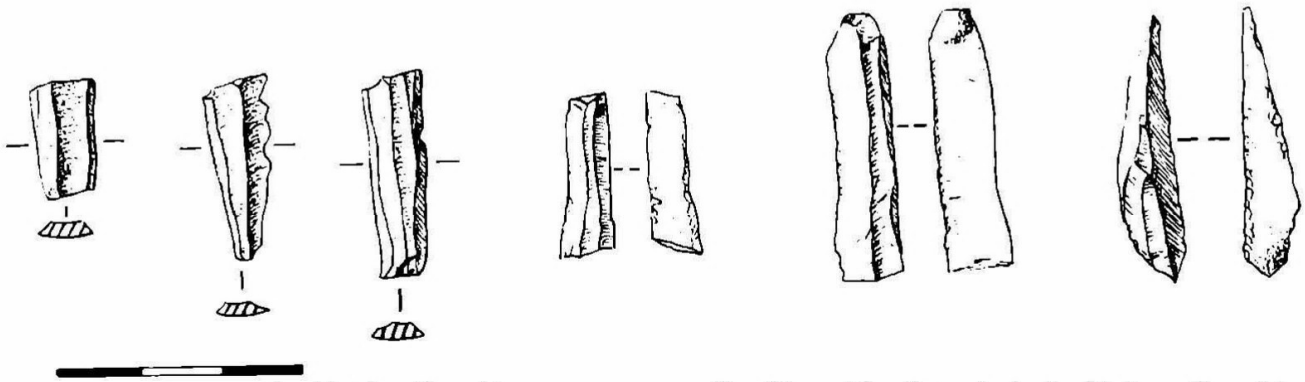


FIG. 79. Bladelet (microblade). Kuprukian.
FIG. 80. Bladelet (microblade). Kuprukian.
FIG. 81. Bladelet (microblade). Kuprukian.

FIG. 82*a* and *b*. Retouched microblades. Kuprukian.
FIG. 83. Point. Kuprukian.

of pressure flaking, parallel sides and parallel dorsal flake scars. The bladelets have thin, proportionally wide striking platforms with extremely small bulbs of percussion, at times barely discernible. Almost all are uniformly flat longitudinally, and have essentially the same cross section for the entire length of the bladelet. Three general cross sections exist as shown in figures 69–74, 75–80, 81.

The bladelets were generally broken at the distal end; less than 50 per cent are broken proximally. They average between 2.0-2.5 cm. in length. Breakage was common because of the thinness (*ca.* 0.2 cm.) of the bladelets.

Retouched specimens seldom occurred, but when present, are finely worked, and removed retouch flakes sometimes are less than 0.5 mm. in size (fig. 82 *a*, *b*). The retouch, always straight, very regular, and never invasive, does not seem to include backing. Most commonly, retouch occurred on one lateral side, either dorsal or, more commonly, the ventral. Some bladelets had retouch on both lateral sides, one dorsal, and one ventral. Possibly the bladelets with

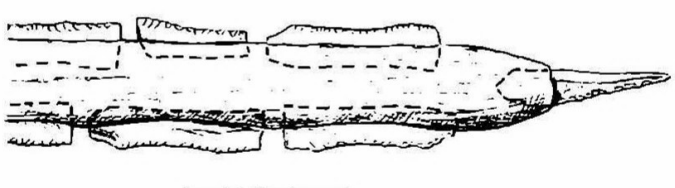


FIG. 84. Point and retouched microblades hafted to a shaft.

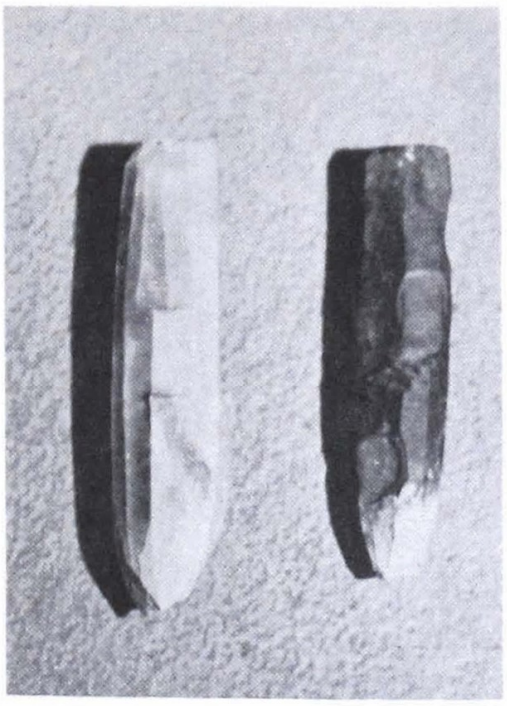


FIG. 85. Two exhausted microblade cores, Aq Kupruk II, cut 5:300. Photo: Klappert. Scale 1/1.

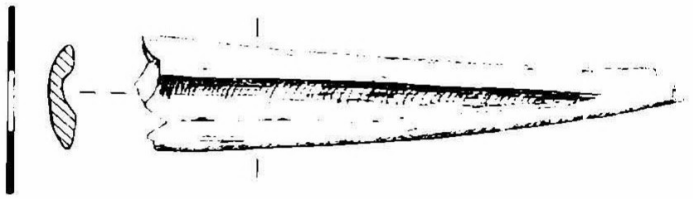


FIG. 86. Polished bone point. Kuprukian.

single-edge retouch were hafted into wood or bone as composite cutting tools. The double-edged retouched specimens are harder to explain, but hafting again comes to mind.

Almost all retouched bladelets, single or double edged, had continuous retouching the full length of the blanks.

A few bladelets exhibited "use retouch" (or utilization); i.e., a few irregularly spaced nicks or scars, generally localized along a small section of an edge. In most cases, "use retouch" occurred on the ventral surface edges.

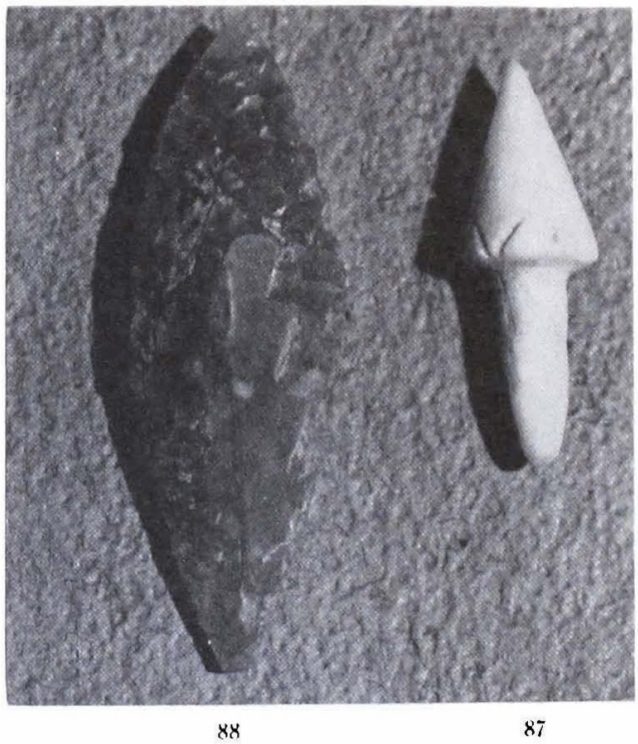
Points (fig. 83). Numerous micropoints were found: some were finely retouched. Possibly the points were used in conjunction with the retouched bladelets to create a composite hafted tool, either as an arrow or light lance (fig. 84).

UTILIZED PEBBLES AND PEBBLE TOOLS

Various utilized river pebbles occurred in all levels of Aq Kupruk I and II; few in AK III. Most were probably used once and discarded, but others showed deliberate flaking into unifacial or bifacial pointed tools or chopper-chopping-tool types.

WORKED BONE IN THE KUPRUKIAN

Incised spatula and bone fragments occurred at all three Kuprukian sites. Polished bone points (fig. 86)



88 87

FIG. 87. Bone point (dart?). Kuprukian. Photo: Klappert.

FIG. 88. Pressure-flaked unifacial point. Ceramic Neolithic. Photo: Klappert. Scale: 1.5×.

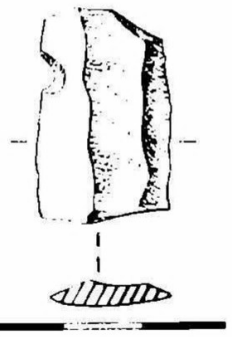


FIG. 89. Sickle blade. Ceramic Neolithic.

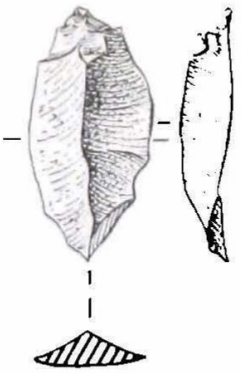


FIG. 90. Point. Ceramic Neolithic.

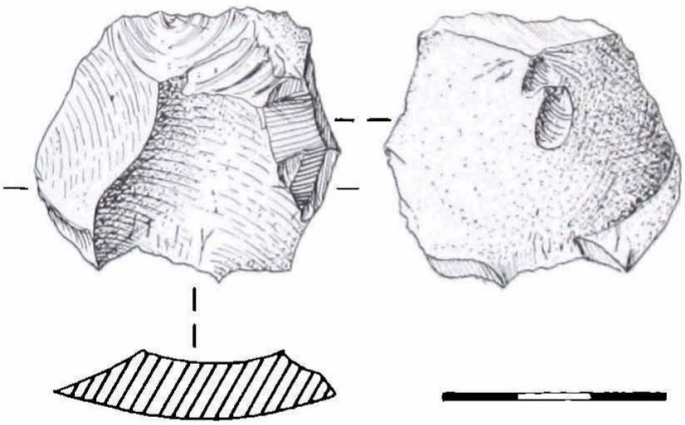


FIG. 91. Débitage flake. Ceramic Neolithic.

FIG. 92. Bone needle. Ceramic Neolithic.

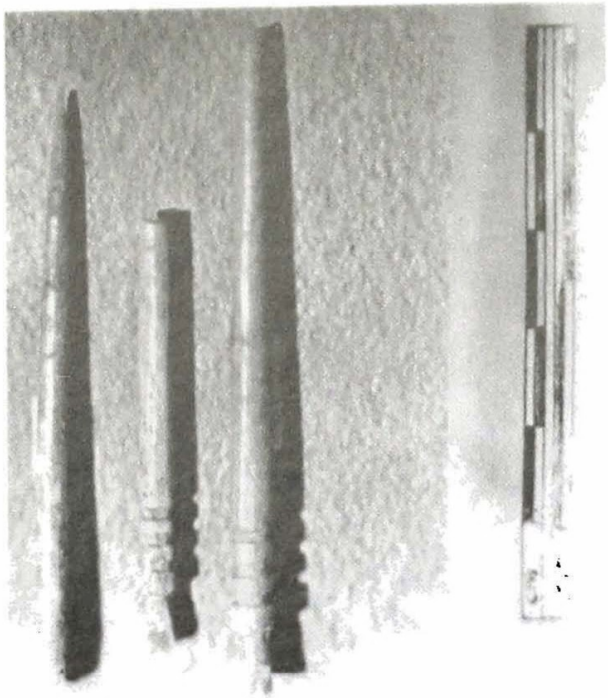


FIG. 93. Bone needles. Ceramic Neolithic (?).
Photo: Klappert.

were also found at Aq Kupruk I and III. A unique small incised bone point (dart?) was found at Aq Kupruk III (fig. 87).

NEOLITHIC OF AQ KUPRUK I AND II

The lithic and bone assemblage of the Non-Ceramic Neolithic and Ceramic Neolithic varied little from each other but greatly from the underlying Kuprukian. More large blades occurred, in addition to the introduction of a collection of "sickle blades," exhibiting the familiar sheen caused by the reaping of wild or cultivated grasses (fig. 89). A series of points, somewhat similar to those of the Kuprukian, occurred in increased numbers (fig. 90). Some dihedral burins continued to show up, as well as a single pressure-

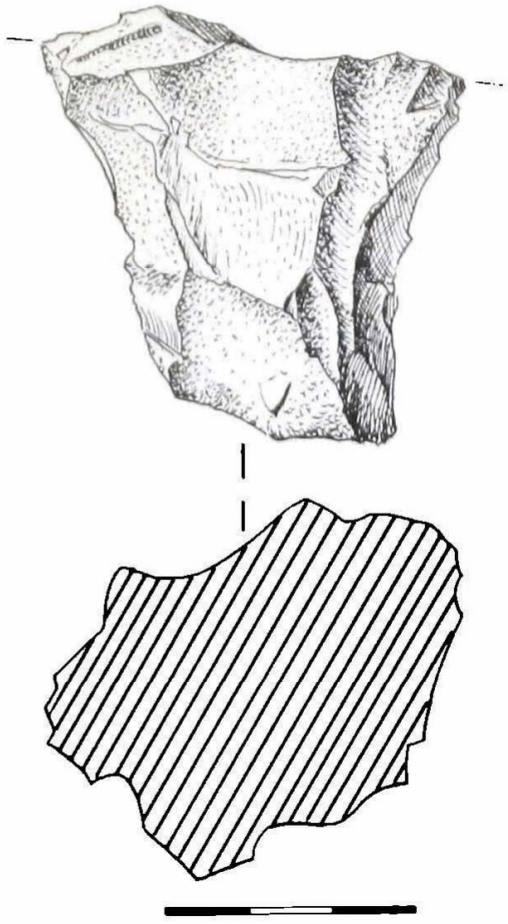


FIG. 95. Core. Mousterian.

FIG. 94. Mousterian implements: Darra-i-Kur.
Photo: Kolb.

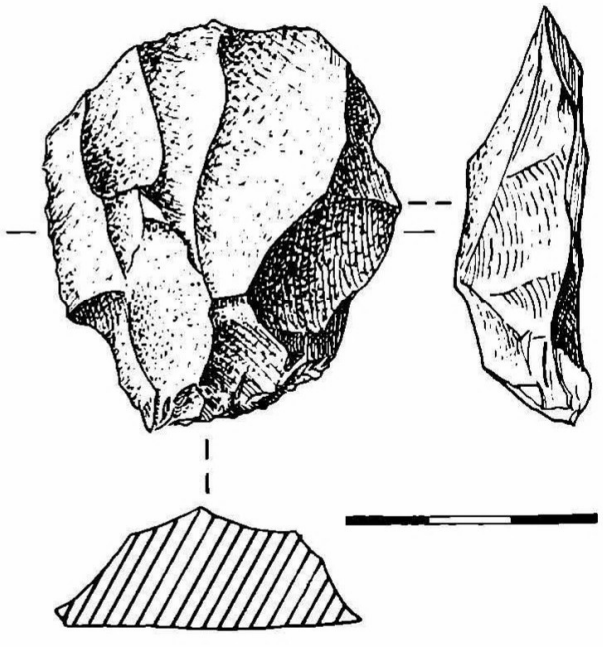


FIG. 96. Levallois flake. Mousterian.

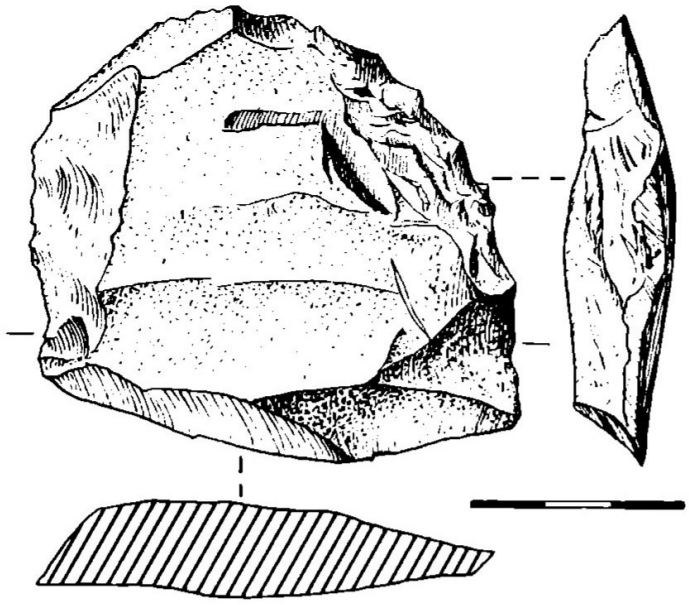


FIG. 97. Levallois flake. Mousterian.

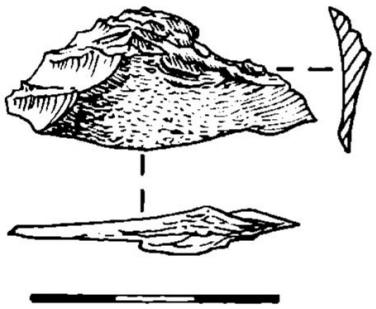


FIG. 98. Side flake from Levallois core. Mousterian.

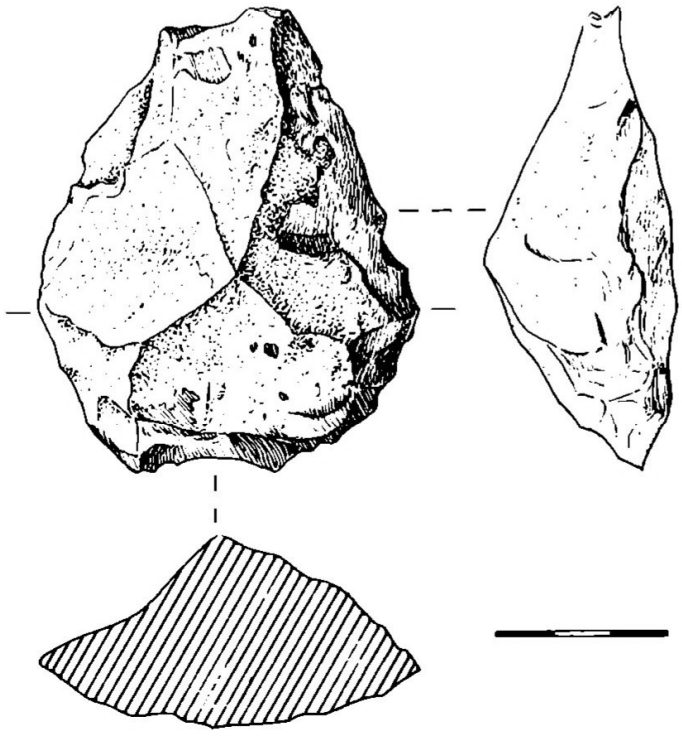


FIG. 99. Handaxe type. Mousterian.

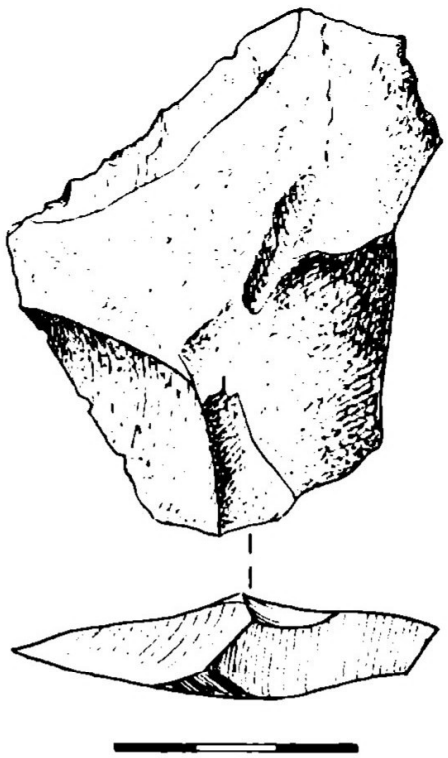


FIG. 100. Oblique flake scraper. Mousterian.

flaked unifacial leaf-shaped point (fig. 88) and a fragment of a bifacial point. The débitage (fig. 91) indicates a heavy dependence on flake tools as well, however.

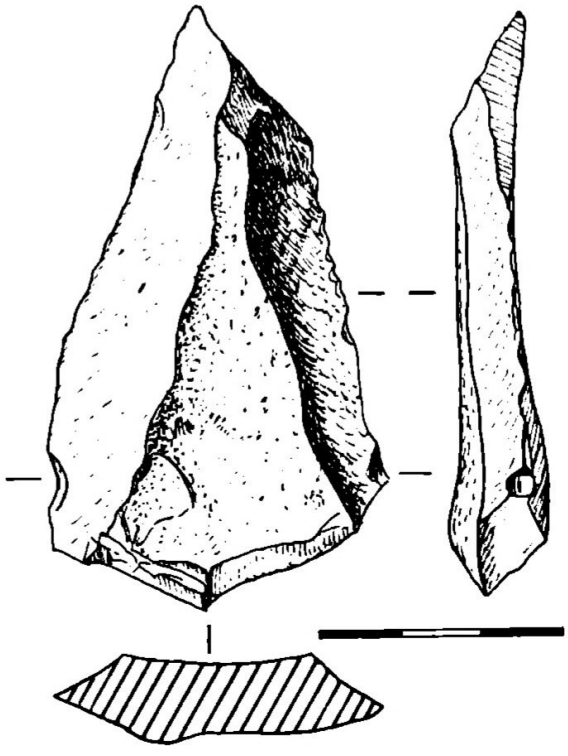


FIG. 101. Levallois point. Mousterian.

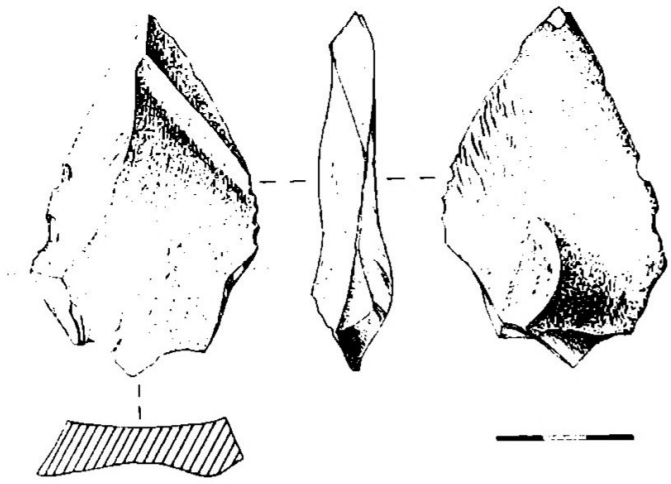


FIG. 102. Levallois point. Mousterian.

Many notched artifacts on flakes appeared in the Aq Kupruk I and II Neolithic. Relatively few had been found in the Kuprukian Upper Palaeolithic levels. In addition to measuring length, width, and thickness, Davis is now analyzing the notches for the following attributes: (1) location (lateral or inverse); (2) location (dorsal or ventral); (3) manufacture (single or multiple blow); (4) size (deeper, more vertical notches called "V"; shallow, wider notches called "broad"); (5) blank (flake, blade, or amorphous). All notched flakes had regularly curved outlines. Under a 6× hand lens, small "use retouch" flakes become visible. Notches were about evenly divided between ventral and dorsal, and most occurred on a lateral edge. Several flakes had "strangled" notches on opposite lateral edges. Most notches were made on thick flakes and with a single blow. About 90 per cent of the notches appear to fall under the category, "small."

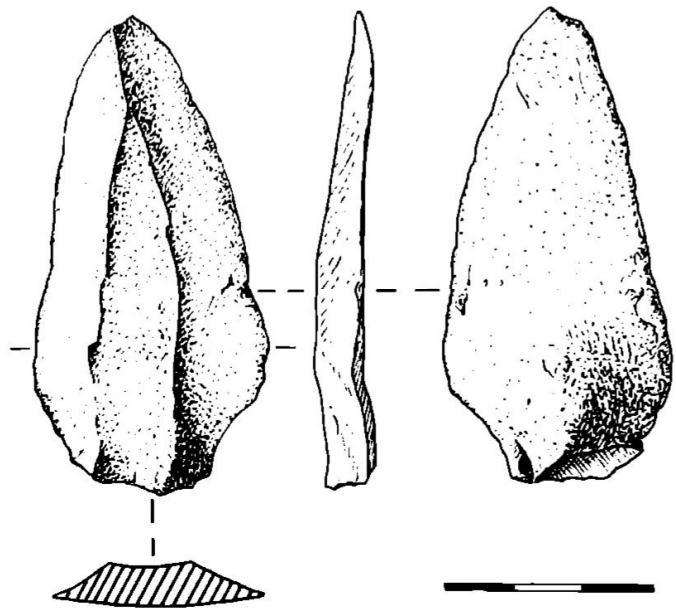


FIG. 103. Levallois point. Mousterian.

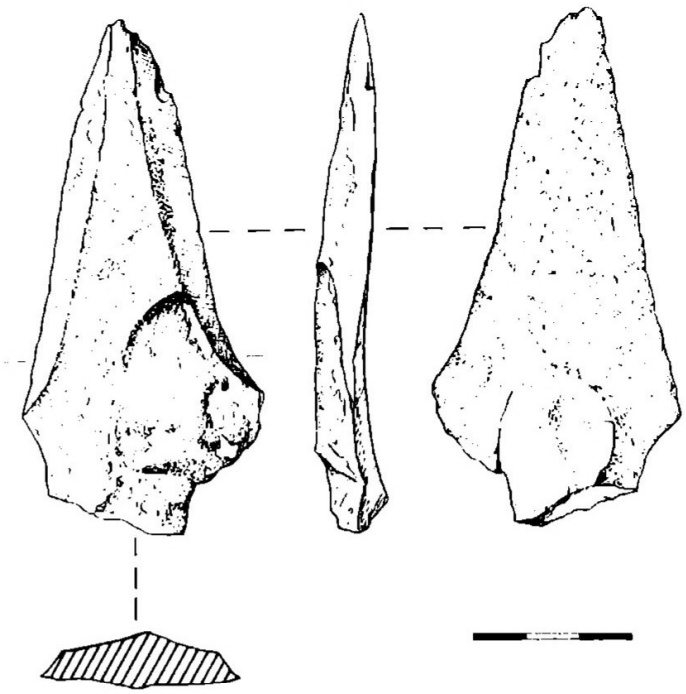


FIG. 104. Leaf-shaped point. Mousterian.

Bone implements were primarily awls, points, and an interesting series of plain and decorated needles (figs. 92, 93).

MOUSTERIAN OF DARRA-I-KUR

Over 800 flakes (primary, utilized, and worked) were found in the overbank deposits which lay on the floor of the cave. Materials used in the manufacture of the tools included various locally available blackish and yellowish-green stones as yet unidentified, possibly a type of "cruddy" flint, but certainly not in the same class as the homogeneous raw material used at Aq Kupruk. Figure 94 shows the general tool types found in the Darra-i-Kur Mousterian: Levallois flakes,

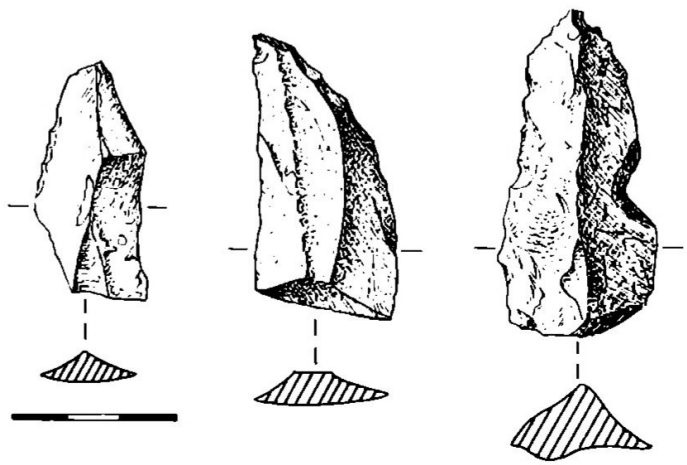


FIG. 105. Leaf-shaped point. Mousterian.
FIG. 106. Oblique point. Mousterian.
FIG. 107. Notched flake-blade. Mousterian.

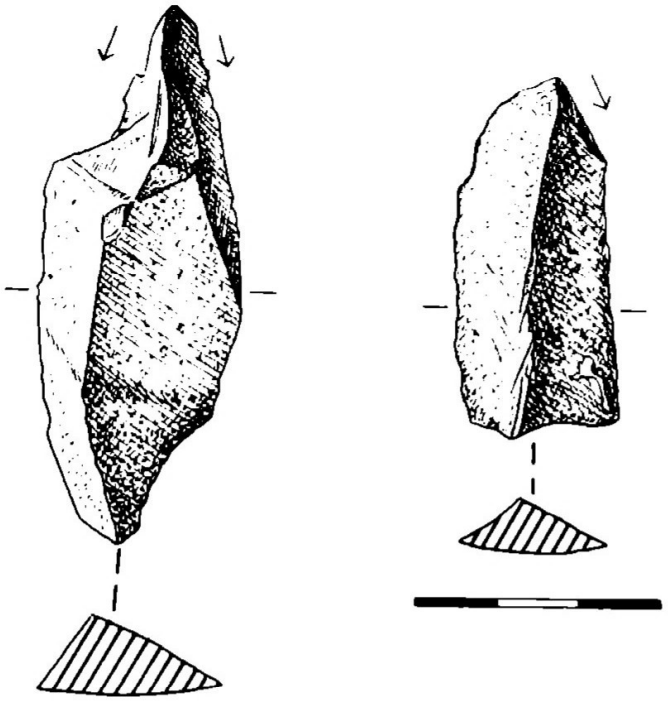


FIG. 108. Possible dihedral burin. Mousterian.
FIG. 109. Blade with burin spall (?) removed. Mousterian.

débitage, hand-axe types, various scraper types, flake-blades, and Levallois points.

Amorphous flake cores (fig. 95) and Levallois flakes (figs. 96, 97) were common, and many of the smaller flakes struck from Levallois cores show pronounced bulbs of percussion, often obliquely positioned on one side (fig. 98), a feature characteristic of many Mousterian assemblages.[40]

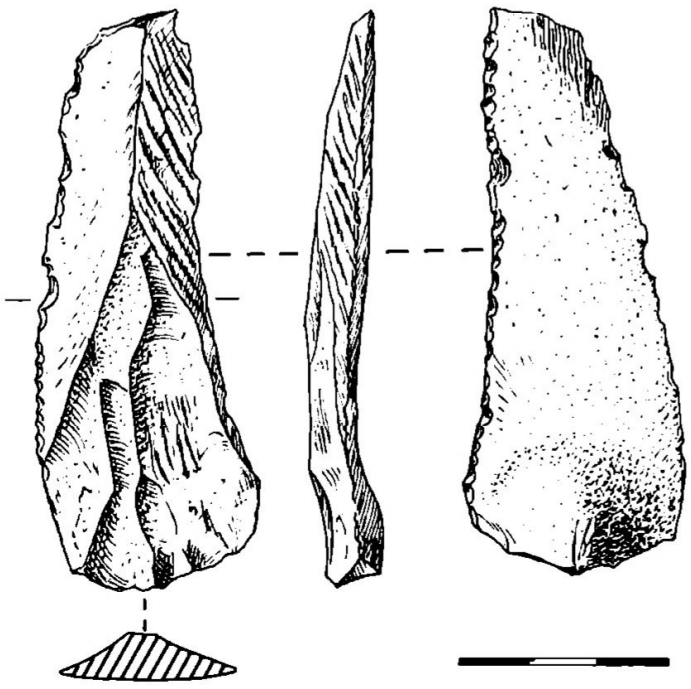


FIG. 110. Retouched blade. Mousterian.

[40] Movius, 1953: p. 38.

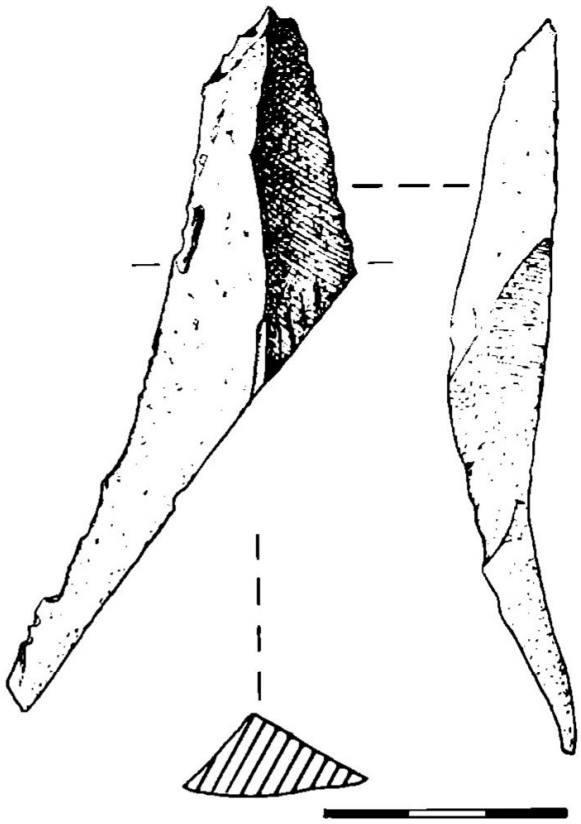


FIG. 111. Core rejuvenating flake. Mousterian.

Hand-axe types, generally rough ovoid in shape (fig. 99; two other examples on figure 94, upper-center of photograph, to the left of an oval cleaver) were found, though not in great numbers, and generally with broken tips. Whether or not the breakage was intentional or accidential cannot as yet be determined.

Scraper types were usually either side scrapers (fig. 94, lower left to right of the two cores) or oblique scrapers (fig. 100; fig. 94, lower right).

A series of rather crude triangular Levallois points (figs. 101–103) occurred in association with several leaf-shaped (figs. 104, 105) and retouched oblique points (figs. 106).

Several notched flakes and flake-blades were found, often made of reddish-yellow stone (fig. 107) more easily worked than the blackish variety of which most tools had been manufactured.

The single possible burin is of the straight dihedral type (fig. 108). A blade, also of the blackish "cruddy" flint, exhibits a scar which may possibly have resulted from the removal of a burin spall (fig. 109). Retouched blades (fig. 110) give the assemblage a transitional flavor. In addition, several core rejuvenating flakes (fig. 111) were found.

A large fabricator found in the Mousterian was possibly used in the manufacture of the stone tools. Both ends had been extensively utilized (fig. 112).

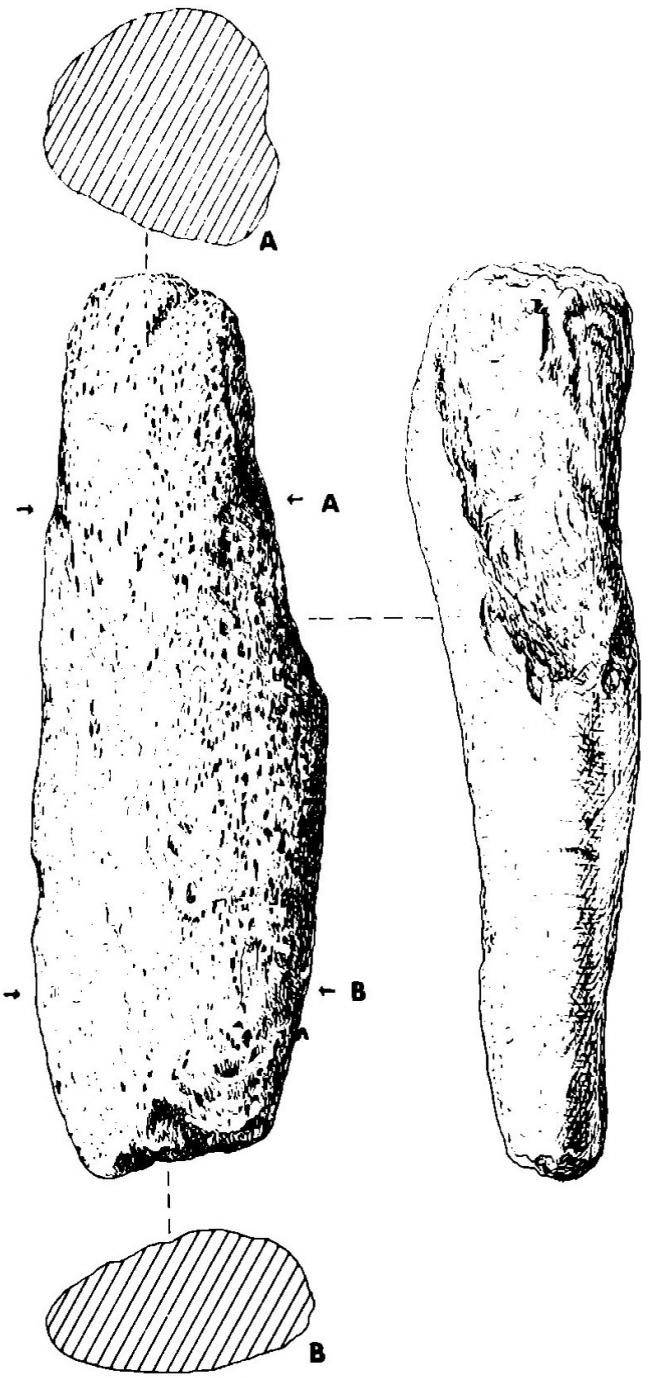


FIG. 112. Fabricator. Mousterian. Scale 1/1.

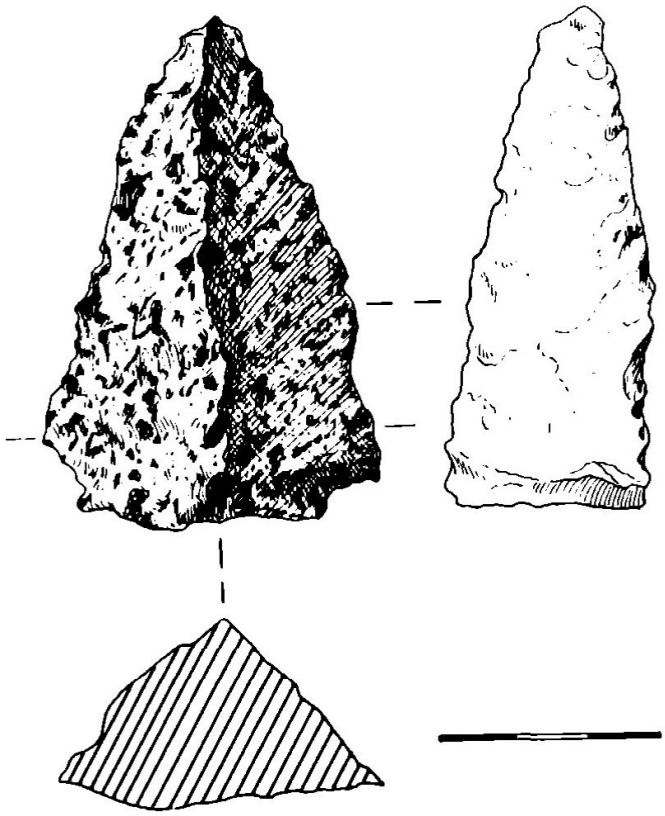


FIG. 113. Diabase point. "Goat Cult" Neolithic.

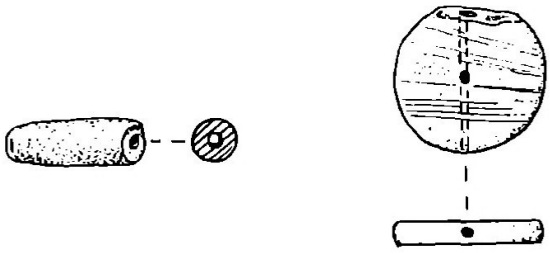


FIG. 114. Limestone (?) bead. "Goat Cult" Neolithic.
FIG. 115. Perforated shell (or limestone ?) disc. "Goat Cult" Neolithic.

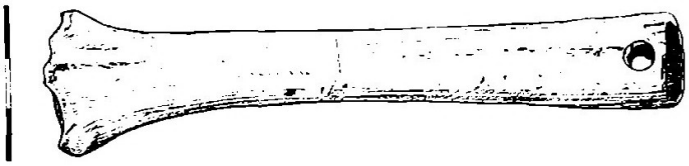


FIG. 116. Perforated long bone. "Goat Cult" Neolithic.

"GOAT CULT" NEOLITHIC OF DARRA-I-KUR

The stone tools of the "Goat Cult" Neolithic included two types: (1) excellent flint blades (some with fine alternate retouch), and possible sickle blades; (2) a series of relatively large diabase points with thickened cross sections and exhibiting extensive use along both edges as well as the ventral ridge (fig. 113). Other stone objects included celts, a slate (?) knife, a broken jasper point, steatite spindle whorls, plus a series of quartzite pebble tools, a limestone (?) bead (fig. 114) and a perforated disc of shell (or limestone ?) (fig. 115) were found. The latter has two holes drilled, one roughly through the center, one longitudinally through the rim.

Grinding stones and broken mortars were found, along with a possible obsidian (?) bracelet fragment.

A unique perforated long bone had been beveled near the perforation and may have been either an ornament or an amulet (fig. 116).

CERAMICS FROM AQ KUPRUK, DARRA-I-KUR, AND HAZAR GUSFAND

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and

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The detailed technical and comparative studies of the ceramic material from Aq Kupruk, Darra-i-Kur, and Hazar Gusfand will be covered in the final monograph. Also to be published in the final report will be a discussion of our philosophy of ceramic analysis. For purposes of this preliminary report, however, we propose to discuss in a general way, the ceramic chronology of the excavated sites and to illustrate some of the more diagnostic types and designs.

Most of the pottery occurred in various levels at Aq Kupruk I (Ghar-i-Mar or Snake Cave). The total sherds studied by Charles Kolb as of this report include the following: AK I (19,765); AK II(1436); AK III(13); AK IV(232); Darra-i-Kur (2334); Hazar Gusfand (130). We had predicted that AK I would have maximum historic occupation and AK II maximum prehistoric occupation because of the relative positions of the two rock shelters. AK II faced south and would probably have provided more comfortable living quarters during the cold periods of the late Pleistocene, whereas AK I faced north in the direction of the flow of the Balkh River, and offered a more attractive historic camp site.

Because the occupants of the shelters were probably all nomadic (or at least semi-nomadic), the pottery assemblages represent successive temporary occupations by numerous diverse groups of wandering peoples. Therefore, the pottery in a single stratum or level often contained several culturally unrelated types, making the collections different from those which would have been uncovered at a single stratified village site of the same period.[41]

In addition, erosional unconformities exist at AK I and AK II between the Early Iron Age and the Ceramic Neolithic, and another exists between the "Goat Cult" Neolithic and the Iron Age at Darra-i-Kur.[42] These natural erosional unconformities account for the mixing of pottery *in situ* at all three sites, which gave the initial false impression that some types had a 5,000-year existence.

The tentative chart on page 34 indicates the cultural periods represented at each site.

[41] Matson, 1958: p. 294, discusses this problem in detail.
[42] Lattman, 1969.

AQ KUPRUK CERAMIC NEOLITHIC (AK I, II: *ca.* 5000 B.C.)

The major type is a crude, soft, chaff, crushed limestone and crushed sherd tempered ware with flat bases and simple rounded rims, probably basins and globular jar types (fig. 117). Another better fired ware with zig-zag incisions (fig. 118) may also relate to this period, but more probably fits into the overlying Aq Kupruk Chalcolithic or even later.

AQ KUPRUK CHALCOLITHIC (?) (AK I: *ca.* 2300 B.C.)

A tentative designation based on four fragments of copper (one is bossed, see Caley's report, pp. 44–45) found in the lower, undisturbed part of the upper gravels above the Ceramic Neolithic. Note also the differential radio-carbon dates on Tentative Chronological Chart 1.

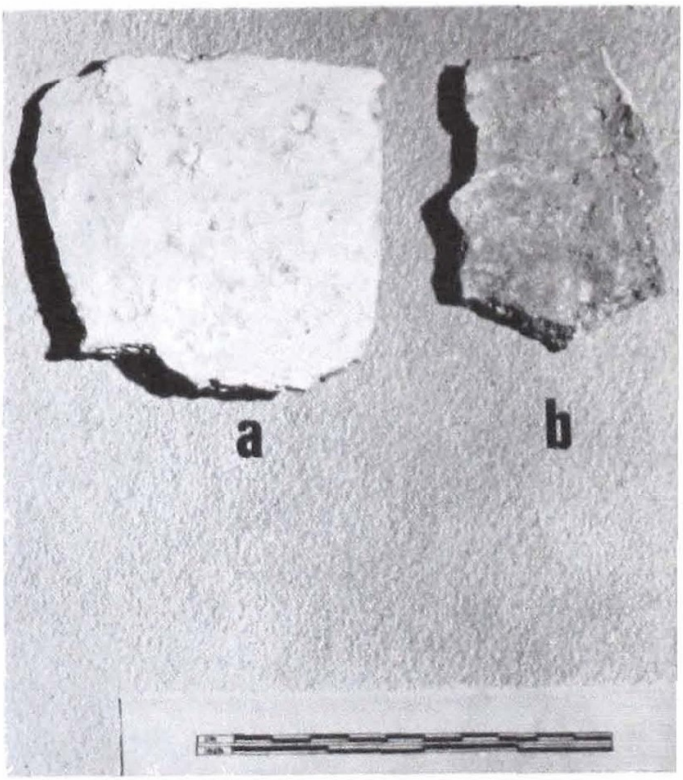

FIG. 117. Ceramic Neolithic Sherds. Photo: Klappert.

TABLE 1

TENTATIVE CHART OF CERAMIC CULTURAL PERIODS AT AQ KUPRUK I–IV, DARRA-I-KUR, AND HAZAR GUSFAND

Cultural periods	AK I	AK II	AK III	AK IV	D-I-K	H.G.
Modern Nomadic: 20th century A.D.	X	X	X	X	X	X
Late Islamic: 13th-19th centuries A.D.	X				X	X
Early Islamic: pre-13th century A.D.	X	X				X
Later Iron Age (Kushano-Sasanian): *ca.* 600 A.D.	X	X		X?	X	X
Early Iron Age: *ca.* 200–400 A.D.	X	X		X?		
"Goat Cult" Neolithic: *ca.* 1800 B.C.					X	
Chalcolithic (?): *ca.* 4300 B.C.	X					
Ceramic Neolithic: *ca.* 5000 B.C.	X	X				

Also see Tentative Chronological Charts.

The crude, soft ware is the same as that of the Ceramic Neolithic but with more varieties present; i.e., Coarse Soft Buff, Limestone Temper Ware; Coarse Hard Buff, Crushed Stone Temper Ware; Coarse Hard Buff, Limestone Temper Ware; Coarse Soft Buff, Crushed Stone Pebble Temper Ware; Hard Buff Limestone Temper Ware.[43]

Vessels were manufactured on a slow wheel (*tournette*), or unpivoted turning slab by the coiling, slab-building and modeling technique. Rim sections were often made as distinct units and joined to jar bodies in separate operations. Joints occasionally occurred on base-side walls where the slab technique was most utilized. All jointing was well-executed and smoothed so that the weld often exhibits no air pockets or excess flashing. Large and medium-sized jars and basins were made in sections, not always true of smaller jar forms. The commonest form was a medium sized globular bodied jar with either a flat or rounded base.

No evidence has been found of a slip, self-slip, wash, paint, or polish on the sherds of this period. One body sherd had a button-node appliqued decoration. Another body sherd had two sets of wet-grooved incisions, 0.02 in width, part of an undiscernible motif.

"GOAT CULT" (BADAKHSHAN) NEOLITHIC
(D-I-K: *ca.* 1800 B.C.)

The two radiocarbon dates (see Tentative Chronological Chart 5) tie in nicely with the two-phase Burzahom Neolithic dates from Kashmir: 1850 ± 130 B.C.; 1540 ± 110 B.C.[44] The ceramic assemblage also resembles that of the later Neolithic of South Siberia and Central Asia.[45] The Neolithic ceramics of Darra-i-Kur are totally different from those found at Aq Kupruk. The most distinctive ware, called Baba Darwesh Black by Kolb, is a crude calcite-tempered type which occurred in globular jar forms with medium necks and either slightly flaring or erect rims. Many of the sherds are reddish grey in color, probably because of differential firing. Simple striated, incised, punctated, and channeled geometric decorations, such as chevrons, multiple parallel lines, outlined triangles, crosshatching, zig-zags, and ladder motifs are common (fig. 119). Several sherds had finger-impression designs; some interior bases had textile or basketry impressions.

Three intentional pit burials of domesticated goats were uncovered. Two skeletons had been decapitated; one had the skull articulated (fig. 157; Tentative Chronological Chart 5). Directly underneath and possibly in association with Burial 3, skull fragments and several long bones of one or two children

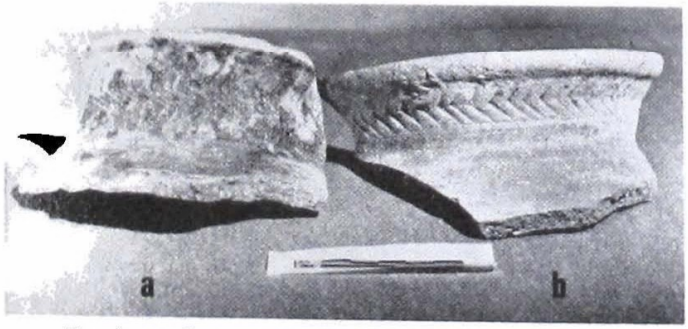

FIG. 118. Ceramic Neolithic (?). Photo: Klappert.

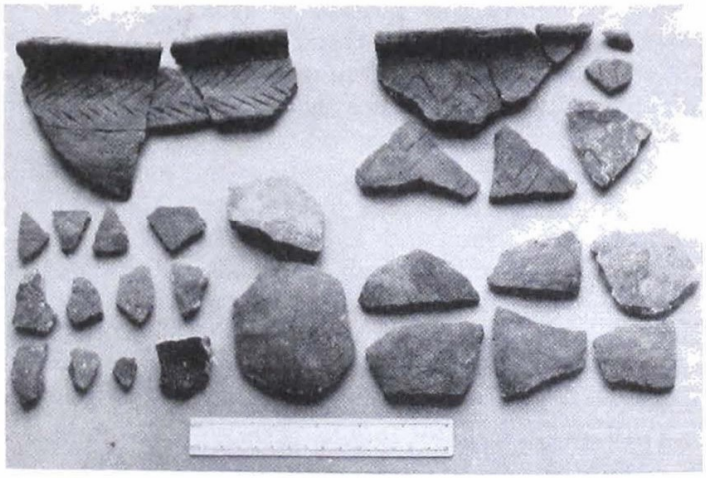

FIG. 119. "Goat Cult" Neolithic. Photo: Kolb.

[43] The terms are those of Charles Kolb. Much of this chapter is based on his continuing preliminary study of the ceramics.

[44] Dales, 1966, 1968.

[45] Vinogradov, 1968.

were discovered. Dr. J. Lawrence Angel is preparing a report on these remains for the final monograph.

A series of at least 80 post molds 2–4 cm. in diameter was noted just under the lip of the cave, and may indicate the use of culinary racks, windbreaks, other shelters, tethering posts, etc.

EARLY IRON AGE (AK I, II, IV?:
ca. 200–400 A.D.)

Plain wares occur in abundance during this period [figs. 121*f,g*; 123*a* (a base stand); 125*b*; 126*f*, a fragmentary figurine handle], but a large series of red

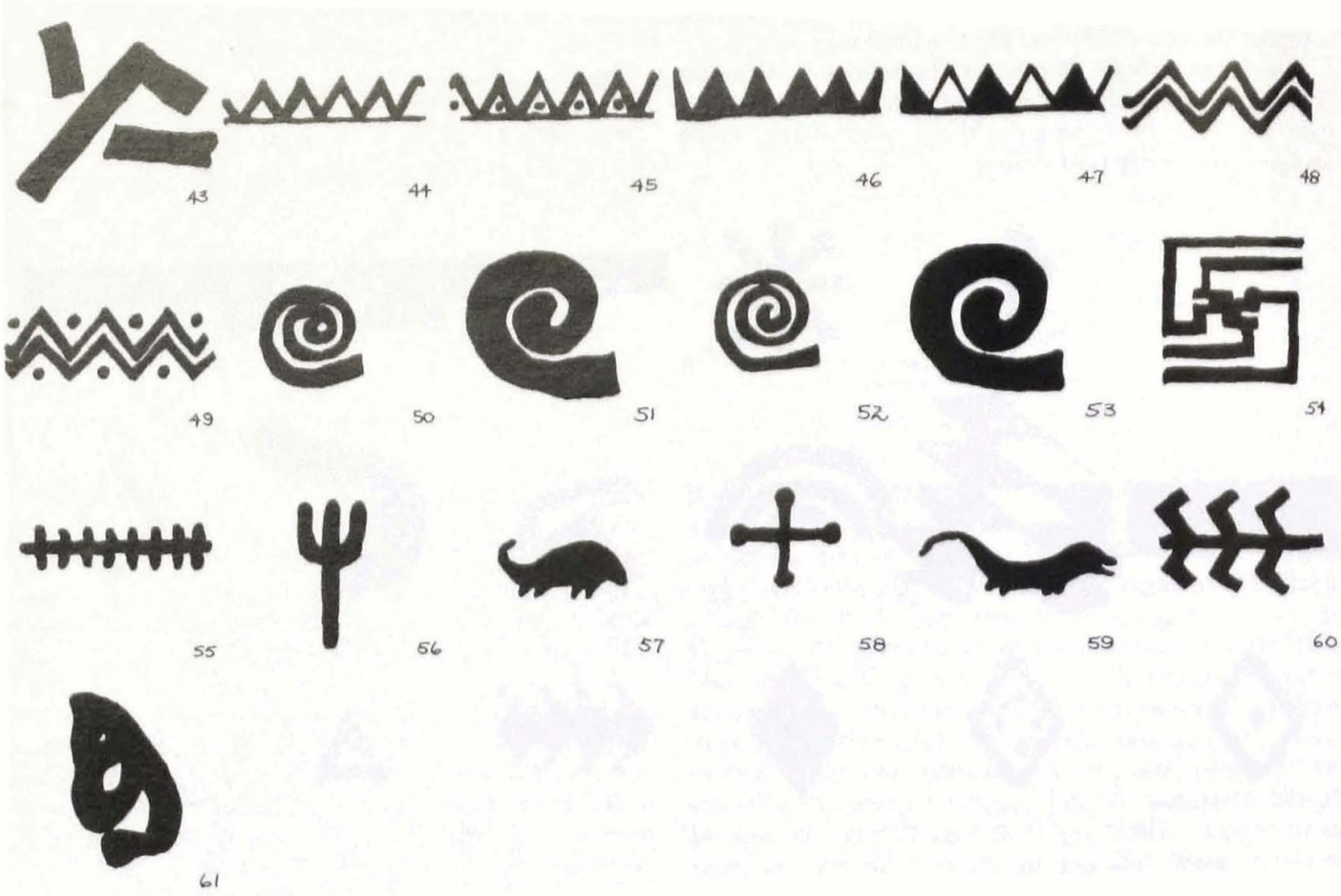

FIG. 120. Preliminary Early Iron Age Ceramic Design Catalog. Drawn by Kolb.

≠1. *Undecorated:* plain paste showing no evidence of painting.
≠2. *Arrow:* a motif with a painted head on a shaft.
≠3. *Asterisk, dot tipped:* a multi-pointed star usually with eight arms with globes on some or all of the tips.
≠4. *Band, rim, narrow (0 − 0.5 cm.):* a single horizontal stripe under 0.5 cm. wide found only at the rim.
≠5. *Band, rim, wide (0.5 + cm.):* a single horizontal stripe over 0.5 cm. wide found only at the rim.
=6. *Band, body, narrow (0 − 0.5 cm.):* a single horizontal stripe up to 0.5 cm. wide found anywhere on the body.
≠7. *Band, body, wide (0.5 + cm.):* a single horizontal stripe over 0.5 cm. wide found anywhere on the body.
≠8. *Checkerboard motif (slanted left):* a motif consisting of a lattice of crossed horizontal and vertical members slanted to the left (when viewing a rim) and having alternated squares pigmented.
≠9. *Concentric arc series:* a motif consisting of alternating bands of pigment and natural paste in half circles radiating from a common center.
≠10. *Chevron, horizontal series, "leaf" motif:* a motif of tear-drops or ovoid figures overlapping and arranged in a pinnate fashion.
≠11. *Curvilinear wide line (spirals etc.) (0.5 + cm.):* a single nonrectilinear stripe over 0.5 cm. wide found anywhere on the body of a vessel.
≠12. *Diamond, open outline:* a motif consisting of a series of rhombus-shaped configurations in outline form.
≠13. *Diamond, open outline, dotted, single:* a motif consisting of a series of rhombus-shaped configurations in outline form with one dot centrally located.
≠14. *Diamond, open outline, dotted, multiple:* a motif consisting of a series of rhombus-shaped configurations in outline form with multiple (usually four) dots evenly spaced within.
≠15. *Diamond, solid:* a motif consisting of a series of rhombus-shaped configurations entirely pigmented.
≠16. *Diamond, solid/chevron series:* a motif consisting of a series of rhombus-shaped configurations entirely pigmented with "fin" extensions.
≠17. *Equilateral triangle, open outline:* a motif consisting of a series of equal-sided triangles in outline form.
≠18. *Equilateral triangle, open outline, bisected:* a motif consisting of a series of equal-sided triangles in outline form with a central dividing line.
≠19. *Equilateral triangle, open outline, dotted, single:* a motif consisting of a series of equal-sided triangles in outline form with one dot centrally located.
≠20. *Equilateral triangle, open outline, dotted, multiple:* a motif consisting of a series of equal-sided triangles in outline form with multiple (usually three) dots evenly spaced within.
≠21. *Equilateral triangle, open outline, multiple chevron:* a motif consisting of a "concentric" series of equal-sided triangles in outline form with a common base.
≠22. *Equilateral triangle, open outline, pronged motif:* a motif consisting of a single equal-sided triangle in outline form with two "arrows" composed of small equilateral triangles (open or solid) on shafts projecting from the base-line of the main triangle.

#23. *Equilateral triangle, open outline, shaded/barred:* a motif consisting of a series of equal-sided triangles in outline form with multiple oblique bars or slats inside.
#24. *Equilateral triangle, solid:* a motif consisting of a series of equal-sided triangles entirely pigmented.
#25. *Equilateral triangle, solid, barbed or hooked:* a motif consisting of a single equal-sided triangle entirely pigmented, with a curved hook on a shaft extending from one angle, or short hooks extending from two or three angles.
#26. *Equilateral triangle, solid, enclosed, single:* a motif consisting of a single equal-sided triangle entirely pigmented, having a common base with a single equal-sided triangle in outline form.
#27. *Equilateral triangle, solid, enclosed, multiple:* a motif consisting of a "concentric" series of equal-sided triangles in outline form with a common base, and the smallest of these being entirely pigmented.
#28. *Equilateral triangle, solid, double triangle:* a motif consisting of two equal-sided triangles, entirely pigmented, and conjoined at the apices to form an "hourglass" figure.
#29. *Equilateral triangle, solid, goat motif:* a motif consisting basically of two equal-sided triangles, entirely pigmented, and conjoined at the apices to form an "hourglass" figure, but with the addition of elements to form the head, horns, tail, and legs of a mountain goat or caprid.
#30. *Fish-tail motif:* a motif consisting of a bifurcated outline.
#31. *Floral motif, "berries" motif:* a naturalistic motif where dots ("berries") appear to grow from a central shaft.
#32. *Floral motif, branch ("tank-track") motif:* a motif consisting of two sets of globe-tipped oblique lines in series radiating from a common point in a pinnate fashion.
#33. *Floral motif, "grass tuft" motif:* a naturalistic motif consisting of lines whose abstract pattern appears to be a clump of long-stemmed vegetation.
#34. *Floral motif, "leaves" motif:* a naturalistic motif consisting of conjoined bilateral ellipses of progressively decreasing size angularly arranged in an odd-pinnate fashion.
#35. *Floral motif, "stalk" motif:* a naturalistic motif consisting of conjoined ellipses of progressively decreasing size angularly arranged in a staggered pinnate fashion.
#36. *Ladder motif:* a motif consisting of two parallel lines with cross pieces at equally spaced intervals.
#37. *Lattice (cross-hatching) motif:* a motif consisting of two series of intersecting parallel lines not necessarily conjoined at right angles.
#38. *Paint "blot" error motif:* a motif consisting of a single amorphous-shaped spatter (probably an error on the part of the painter).
#39. *Parallel line series, narrow (0 − 0.2 cm.):* a group of equally spaced stripes up to 0.2 cm. wide interspaced by natural areas of approximately the same width.
#40. *Parallel line series, wide (0.2 + cm.):* a group of equally spaced stripes over 0.2 cm. wide interspaced by natural areas of approximately the same width.
#41. *Pennant series motif:* a motif consisting of a group of isosceles triangles entirely pigmented with their common bases resting on a single vertical line.
#42. *Random line motif:* a motif consisting of a series of discontinuous lines (usually 0.5 + cm. wide) in irregular patterns.
#43. *Rectilinear wide line motif (0.5 + cm.):* a single noncurvilinear stripe over 0.5 cm. wide found anywhere on the body of a vessel.
#44. *Serration motif, single line, open:* a motif consisting of a series of miniature equilateral triangles (with sides less than 0.4 cm. long) in outline form and having a common baseline.
#45. *Serration motif, single line, open, dotted:* a motif consisting of series of miniature equilateral triangles (with sides less than 0.4 cm. long) in outline form and having a common baseline, and with one dot centrally located in each triangle.
#46. *Serration motif, single line, solid:* a motif consisting of a series of miniature equilateral triangles (with sides less than 0.4 cm. long) entirely pigmented and having a common baseline.
#47. *Serration motif, single line, solid and open (alternating):* a motif consisting of a series of miniature equilateral triangles (with sides less than 0.4 cm. long) successively entirely pigmented and in open outline.
#48. *Serration motif, multiple line, open:* a motif consisting of a series of miniature equilateral triangles (with sides less than 0.4 cm. long) in outline form and having a common baseline, plus an additional single zig-zag line at a set distance above the apices and troughs.
#49. *Serration motif, multiple line, dotted:* same as #48, with dots.
#50. *Spiral (right hand), rim, narrow (0 − 0.2 cm.):* a motif consisting of one or series of helical lines less than 0.2 cm. wide connected to a baseline when in a series arrangement, and found adjacent to the rim of a vessel.
#51. *Spiral (right hand), rim, wide (0.2 + cm.):* a motif consisting of one or series of helical lines more than 0.2 cm. wide connected to a baseline when in a series arrangement, and found adjacent to the rim of a vessel.
#52. *Spiral (right hand), body, narrow (0 − 0.2 cm.):* a motif consisting of one or a series of helical lines less than 0.2 cm. wide connected to a baseline when in a series arrangement, and found anywhere on a vessel *except* adjacent to the rim.
#53. *Spiral (right hand, body, wide (0.2 + cm.):* a motif consisting of one or a series of helical lines more than 0.2 cm. wide connected to a baseline when in a series arrangement, and found anywhere on a vessel *except* adjacent to the rim.
#54. *Swastika motif:* a motif in the form of a Greek cross with the ends of the arms extended at right angles all in the same rotary direction.
#55. *Track motif:* a motif consisting of a single line with cross pieces at equally spaced intervals.
#56. *Trident motif:* a motif consisting of a "trifurcated" or pitchfork-shaped line.
#57. *"Ladybug" motif:* a motif consisting of a near hemisphere entirely pigmented and with small projections from the linear surface.
#58. *Greek cross motif:* a motif consisting of four equal arms radiating from a common center (e.g., an addition sign) and with globes on all four tips.
#59. *"Animal" motif:* a motif resembling an "unidentified quadruped" having a snout and tail.
#60. *Chevron series, multiple:* a motif consisting of two *sets* of diagonal stripes meeting at an angle conjoined on a common baseline.
#61. *"Insignia" motif:* a motif consisting of a curvilinear line more than 0.2 cm. wide.

on buff painted ceramics were also found. Some black on buff (a firing variant of the red on buff) occurred. Simple rim banding was a popular decoration, but design motifs included (fig. 120 is a design catalog prepared by Kolb): free flowing repeated spirals (for examples, see figs. 121*a,e*; 122*d,f*; 123*b,c*;

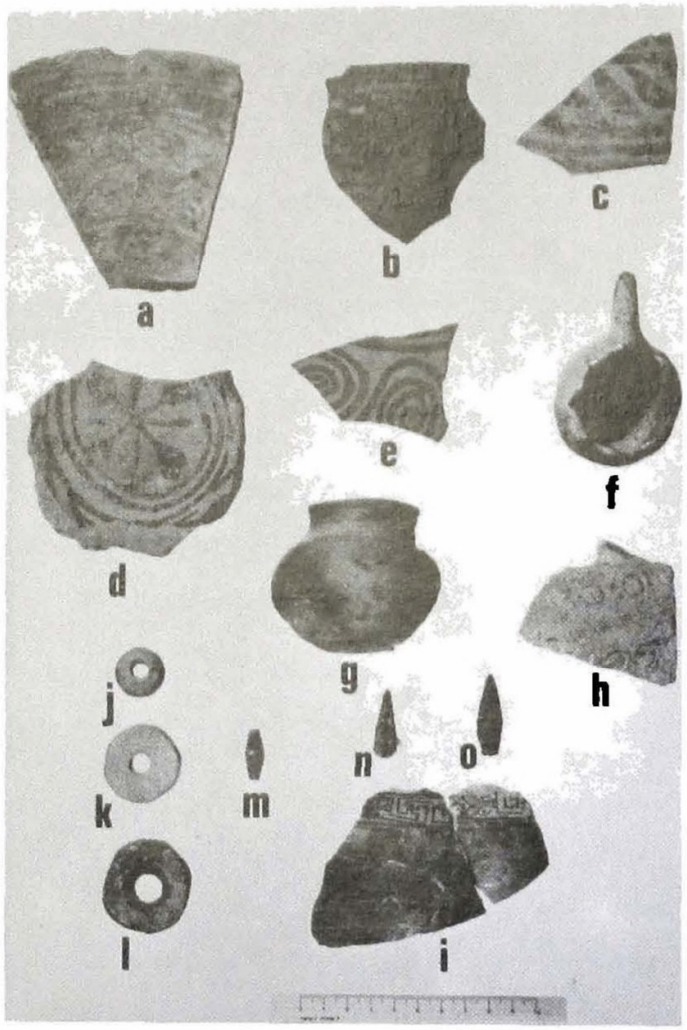

FIG. 121. Early Iron Age. Pottery, clay spindle whorls, carnelian bead, bronze projectile points. Photo: AMNH no. 329668.

124*a*,*b*; 125*f*); cross-hatching variations (figs. 122*a*; 124*f*,*g*); wavy lines (also incised, fig. 126*a*); checkerboards (figs. 121*b*; 123*c*); dot-tipped crosses (fig. 122*b*); naturalistic fauna (many wild goats) in both naturalistic (figs. 127) and stylized (usually joined) solid equilateral triangles, at times with incipient

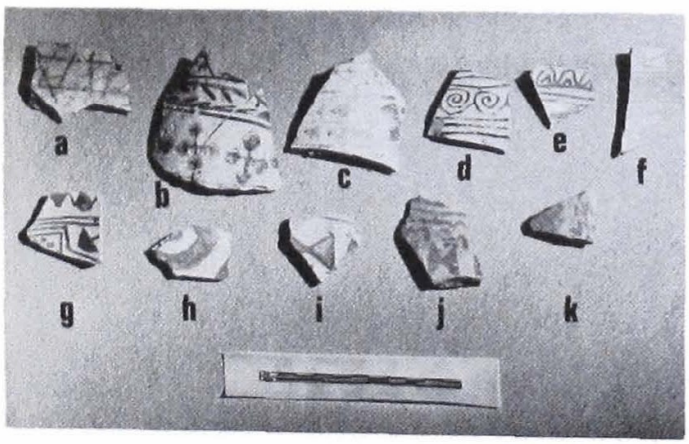

FIG. 122. Early Iron Age Pottery. Photo: Klappert.

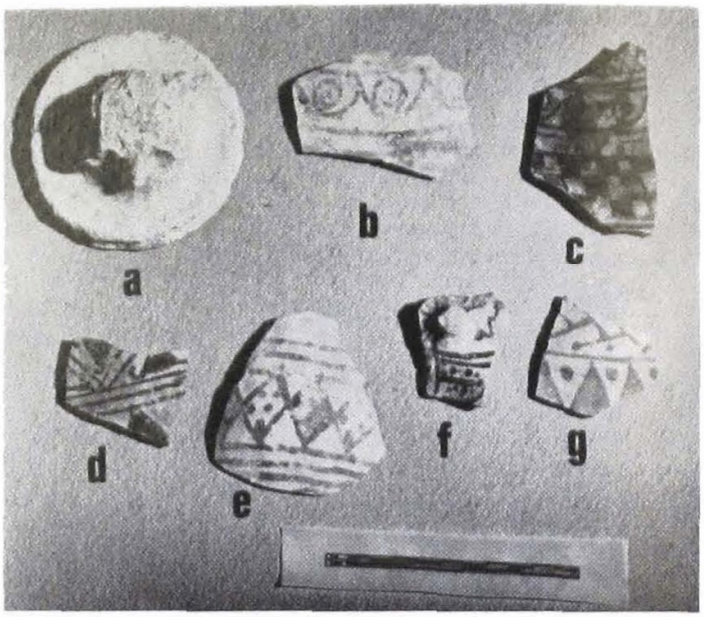

FIG. 123. Early Iron Age Pottery. Photo: Klappert.

horn (figs. 122*i*,*j*; 124*h*) forms; floral motifs (figs. 121*c*; 122*k*; 126*d*); dot or line-filled, outlined triangles and diamonds (figs. 123*e*; 124*e*; 125*e*); combinations of geometric and dotted motifs (figs. 122*c*,*e*,*g*,*h*; 123*f*,*g*; 124*c*,*d*; 126*b*,*c*,*e*). A less frequent motif consisted of isolated, solidly painted equilateral triangles with "button hooks" at each corner (fig. 123*d*).

Painted designs occur on both the interior (i.e., fig. 121*d*) and exterior of vessels, but usually one or the other instead of both.

A polychrome black and two shades of red on buff ware had repeated swastikas and possible fish-tail motifs as decorations (figs. 121*i*).

Several sherds had been decorated using a hollow tube or bone (figs. 121*h*; 125*a*). A number of sherds had appliquéd goat horns (figs. 125*c*,*d*), again probably emphasizing the importance of the goat in the cultural patterns.

Also found was a unique animal-headed handle,

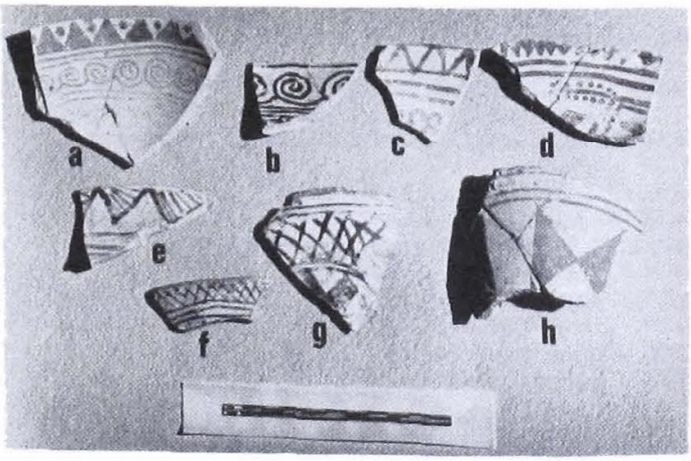

FIG. 124. Early Iron Age Pottery (*h* is upside down in photo). Photo: Klappert.

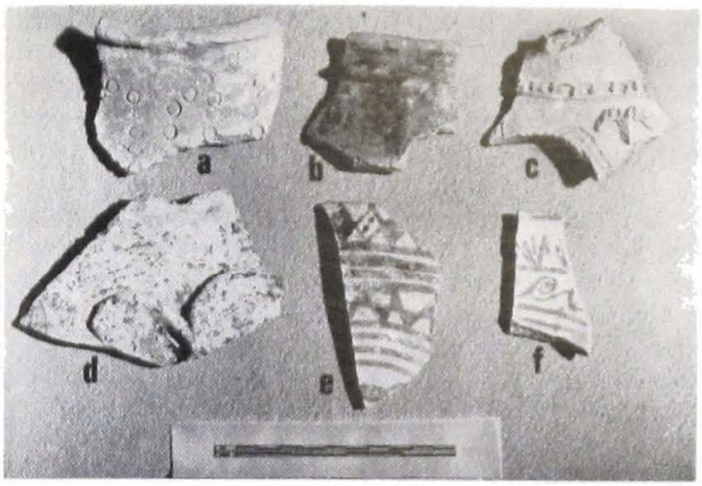

FIG. 125. Early Iron Age (*e* is upside down). Photo: Klappert.

belonging to a red-slipped, slightly burnished vessel (fig. 128).

Red Streak-Pattern Burnished Ware sherds also appeared in this period.[46]

A distinctive, highly fired ware occurred mainly at AK 1: a buff-ware pottery, stamped before firing with eight-pointed stars or rosettes, palmettes, "cumulus clouds," or "pine tree" decorations on the necks and shoulders of the jars. Prefired orange or matte black slips were always applied to these motifs; all these sherds were fired twice, once to firm up the pottery, then the slip was applied just prior to the second firing.[47]

Figure 121 also shows two bronze trilobate projectile points, three clay spindle whorls, and a carnelian bead.

Probably several nomadic groups are represented in the Early Iron Age levels, but historically the period approximately coincides with the development of the Silk Route, the breakup of the Kushan Empire, and the rise of the Sasanians.

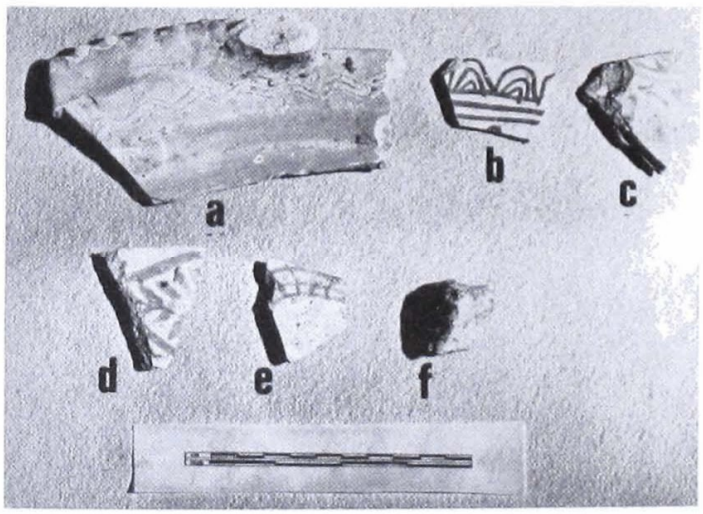

FIG. 126. Early Iron Age Pottery. Photo: Klappert.

[46] For a description of this ware, see Dupree, 1958: p. 202.
[47] For a description, see Gardin, 1963.

FIG. 127. Early Iron Age Pottery. Interior of "Fruit Bowl" base. Photo: Klappert. Scale *ca.* 1 1.

LATER IRON AGE (AK I, II, IV?; D-I-K; H.G.: *ca.* 600 A.D.)

Painted sherds continue into the Later Iron Age, but are neither so numerous nor varied in motifs. The single red band was the most common design (fig. 129*b*), with the repeated spiral running second.

FIG. 128. Early Iron Age. Animal figurine on handle. Red Burnished ware. Scale 2×. Photo: Klappert.

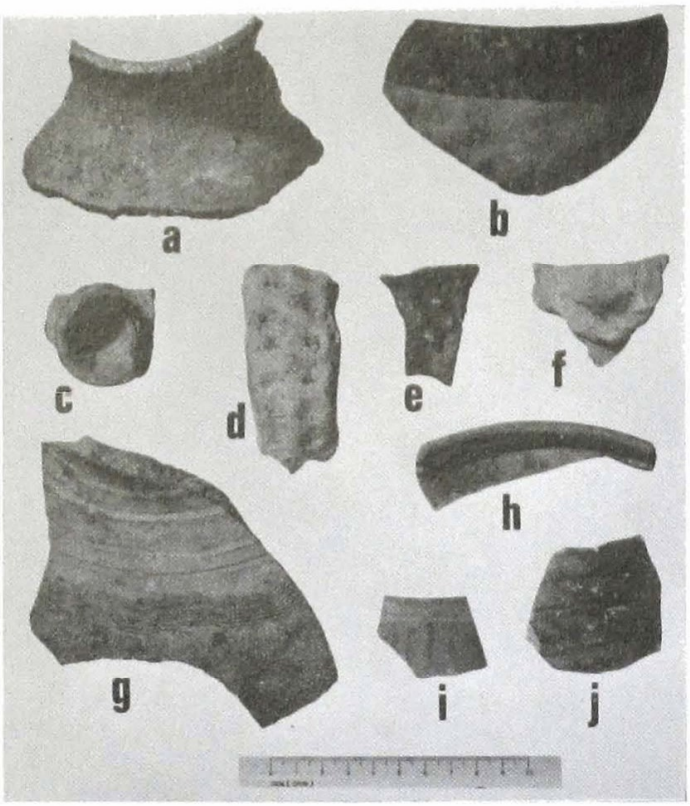

FIG. 129. Later Iron Age Pottery. Photo: AMNH no. 329670.

The red band occurred on either interior and exterior (sometimes both) sides of the rim; forms were mainly small hemispherical and conical bowls with rounded lip rims. One handle sherd had an appliquéd pommée cross (fig. 129*e*.)

Most of the ceramic assemblage, however, consisted of domestic, utilitarian wares, primarily represented by large cream-slipped, highly fired, neckless storage jars. Two were recovered nearly intact (figs. 130, 131). Several hundred rim, decorated, and plain sherds were recovered. The jars and jar sherds had either flat (dominant) or carinated bases, tapered slightly inward from shoulder to base, generally averaging between 65 and 85 cm. in height with maximal shoulder diameters of 48 cm. However, concave ring bases did occur (fig. 129*c*). The vessels were apparently not wheel-turned, but constructed in at least two units with the base attached to the body prior to firing; evidence also exists for a shoulder-rim joint. Rims were invariably everted in form and had deep, multiple parallel lip groovings. Temper consisted of crushed limestone and gritty mineral and crushed sherd inclusions. The vessels were always thick walled, and the coarse, non-plastic grains served to reduce the rate of shrinkage and prevent cracking during firing. Post-fired cores are dark gray bordered by very thin buff-tan to light brown on the interior and exterior surfaces. Designs included multiple incised parallel lines (either straight or wavy; fig. 129*g*), as well as occasional swirls and incised and punctated geometric and curvilinear patterns on the shoulders. Another form of this utilitarian, limestone-tempered ware included smaller globular shaped jars of varying sizes and neck heights, normally with undecorated everted or erect rims.

Both limestone-tempered (fig. 129*a*) and vegetable-chaff-tempered wares occurred. Both types (or possibly sub-types of the same ware) had two major forms: a plain, undecorated, hemispherical bowl; a small, squat, globular storage jar with a flat base, long neck, and slightly flaring rim.

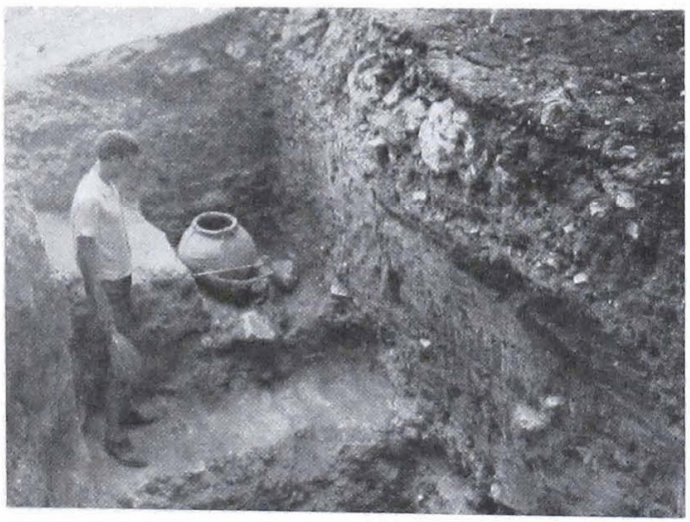

FIG. 130. Later Iron Age. Hard Buff limestone temper storage jar *in situ*. 1962. Photo: Dupree.

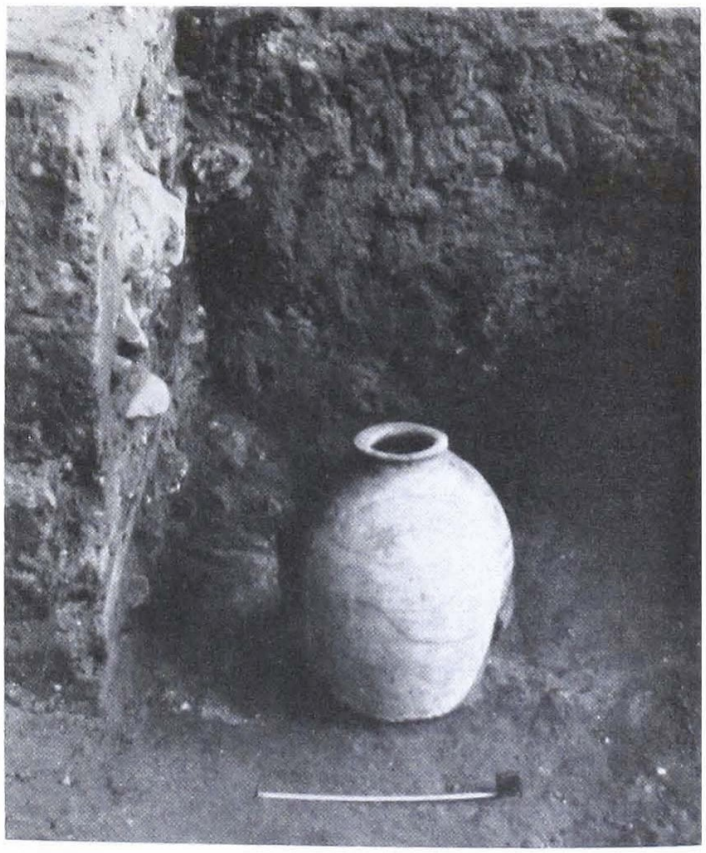

FIG. 131. Later Iron Age. Hard Buff, limestone temper storage jar *in situ*. 1965. Photo: Dupree.

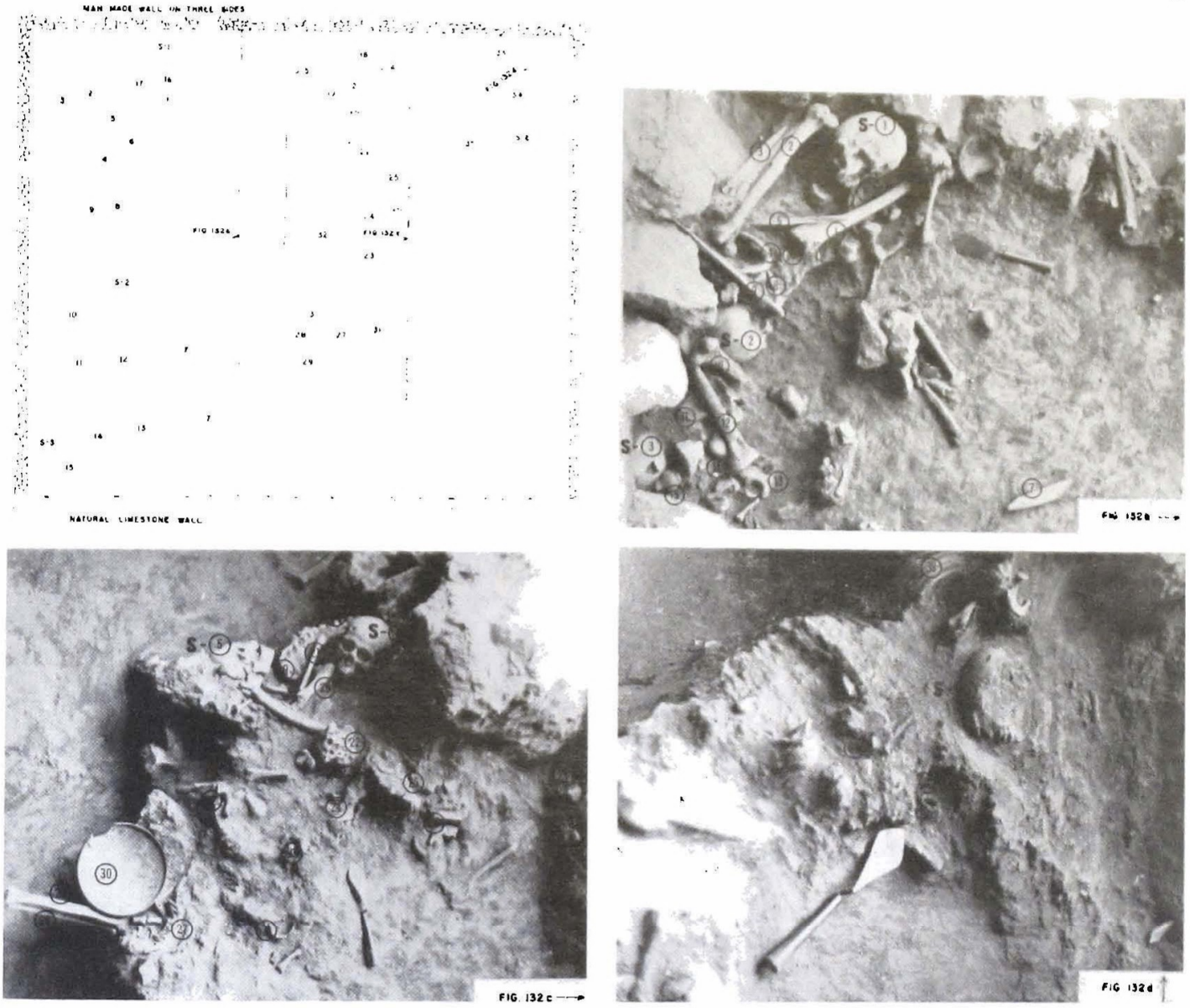

FIG. 132. Aq Kupruk IV: The Iron Age Burials. 1965. Photos: Dupree. Sketch: Samizay. (*a*) Sketch (not to scale) showing relative position of skeletal material. (*b*) Skulls 1, 2, 3, and associated finds. Direction of arrow in photo indicates relative position with arrow on 132*a*. Numbers below refer to numbers on the photograph. S 1 (Skull 1); S 2 (Skull 2); S-3 (Skull 3); 1 (femur); 2 (femur); 3(tibia); 4 upside down mandible; 5 (fibula); 6 (scapula); 7 (scattered long bones); 8 (rib) 9; (tibia); 10 (femur); 11 (scapula); 12 (tibia); 13 (fragmentary pelvis); 14 (snail); 15 (unguent jar, also see fig. 133); 16 (bronze mirror, also see fig. 10); 17 (Red Streak-Pattern Burnish Plate, also see fig. 9). (*c*) S 4 (Skull 4); S-5 (Skull 5); 18 (vertebrae); 19 (coccyx); 20 (femur); 21 (tibia); 22 (coccyx); 23 (mandible); 24 (mandible); 25 (mandible); 26 (mandible); 27 (mandible); 28 (radius); 29 (ulna); 30 (Red Streak-Pattern Burnish Plate); 31 (pottery lamp); 32 (amphora handle, also see fig. 134). (*d*) S 6 (Skull 6); 33 (child's rib cage); 34 (humerus); 35 (scattered amphora sherds, also see fig. 134).

Other buffish wares occurred, at times with finger impressed (e.g., handle, fig. 129*d*,) or appliquéd (fig. 129*f*) decorations.

The distinctive Red Streak-Pattern Burnish Ware, possibly related to Roman Arretine Ware occurred, though not so numerous as in the Early Iron Age (fig. 129*h-j*).

Evidence for the Iron Age (whether Early or Later remains a moot question, but evidence indicates the burials may fall *between* the two) occurred at Aq Kupruk IV (Skull Cave), where a burial area contained remains of ten individuals. The skeletons and grave furniture were surrounded on three sides by a rough enclosure of limestone blocks; the fourth side was the cave wall (fig. 132*a*). Most of the skeletons were at least partly disarticulated, and included specimens of male and female adults and children. The entire population is being studied by Dr. J. Lawrence Angel, John Bear, and Joy Bilharz in the physical anthropology laboratory of the Smithsonian Institution.

Grave furniture included two nearly complete Red

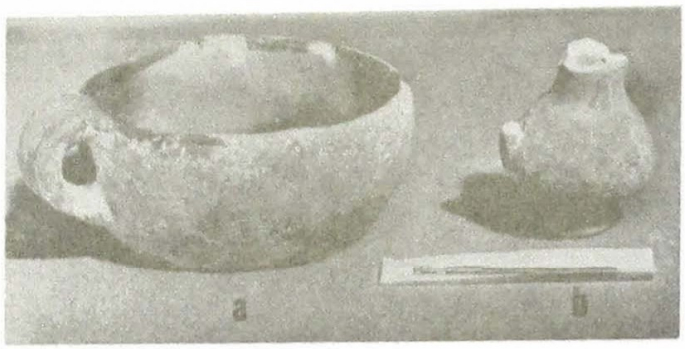

FIG. 133. Aq Kupruk IV. Pottery from the burials. Photo: Klappert.

Streak-Pattern Burnished almost flat plates with annular bases and erect, horizontally channelled rims with simple tapered lips (fig. 9). The wheel-turned vessels are practically identical in size and shape; e.g., maximum diameters were 22.5 and 22.4 cm. A reddish-orange slip covered the entire interior surface and the exterior rim, and ran down the natural buff exterior. Both vessels had interior decorations, probably executed with a stylus before the slip dried. The motif consisted of over-lapping elliptical elements (22 on one; 44 on the other) arranged in a "sunburst" pattern radiating from the center. Several other items were found in association with the plates: a circular bronze mirror (probably of Chinese origin or inspiration), a silver ring with a lapis lazuli setting, and a lapis bead (fig. 10).

Two shallow lamps with fine chaff and limestone temper were also found; one had a narrow red painted band on the rim. Other ceramic finds included a handmade buff cup, resembling a modern coffee cup, with hematite red paint unevenly executed on the rim and handle. The exterior and interior surfaces showed preliminary finger-smoothing, and the base bore evidence of "string-cutting" detachment from the clay matrix (fig. 133, left). Also uncovered was a miniature globular-bodied, flat based, buff unguent (?) jar, 5.6 cm. in preserved height (fig. 133, right). The jar has a reddish-orange slip somewhat similar to that of the Red Streak-Pattern Burnish Ware, but lacks the decoration.

Scattered throughout the interment chamber were 39 sherds of a distinct handmade, bichrome, matte chocolate-brown slipped creamware, part of a double strap-handled amphora-like jar (fig. 134). The reconstructed vessel had a globular body 20 cm. in diameter, a 6-cm.-high neck, and an interior diameter opening of 8 cm. The base and portions of the side wall and rim were missing. However, the jar apparently had a rounded base. While the clay was still plastic, the potter executed five horizontal grooves in a concentric pattern at the neck/shoulder junction. The entire top half of the jar was "brush slipped," with some slip running down the lower half on the natural cream-colored portion. Differential kiln conditions accounted for the color variations of the slip, ranging from matte black to light chocolate-brown.

Several other non-ceramic items occurred in association with the burials (fig. 10: five copper finger rings, one bracelet fragment, three straight pins, five unidentifiable bronze and copper fragments; two iron daggers, two projectile points, three iron fragments, probably horse trappings; one silver finger ring; four carnelian beads.

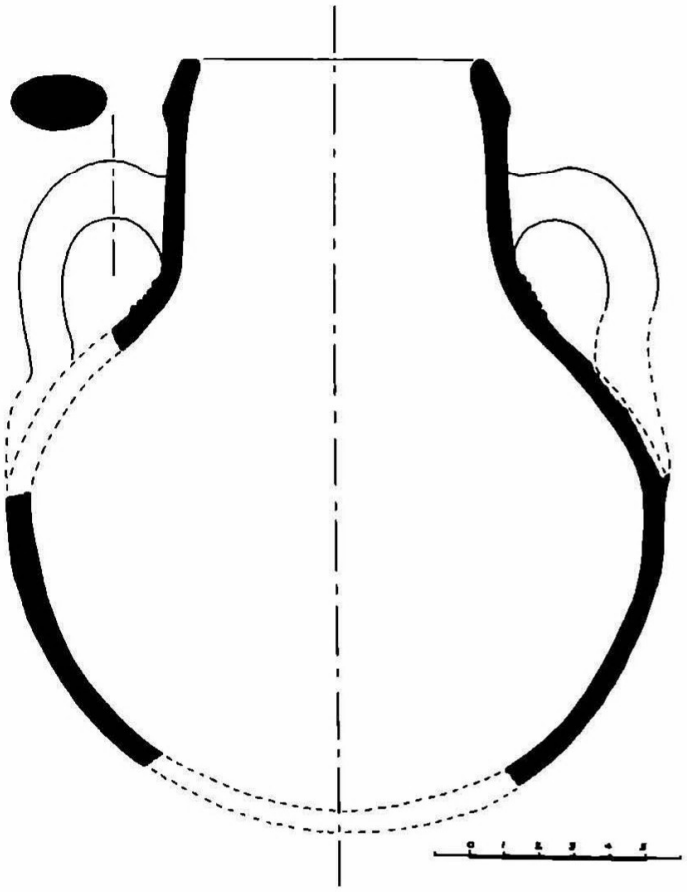

FIG. 134. Aq Kupruk IV: Amphora-like pottery vessel. Reconstructed by Kolb. Drawn by Kolb.

THE ISLAMIC PERIODS

Nothing unique occurred in the Early, Late, and Modern Islamic levels at any of the sites. The pottery is similar to that described in previously published reports,[48] as well as the assemblage found by the Italian Mission of Is.M.E.O. (Istituto Italiano per il Medio ed Estremo Oriente), directed by Professor G. Tucci, but as yet unpublished, Detailed analyses of these important historic ceramic assemblages from AK I-IV, D-I-K, and H.G. are being prepared for the final monograph.

[48] Dupree, 1958; Gardin, 1957, 1963.

RESULTS OF AN EXAMINATION OF FRAGMENTS OF CORRODED METAL FROM THE 1962 EXCAVATIONS AT SNAKE CAVE, AFGHANISTAN

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The fragments submitted for examination were obviously corroded parts of metal objects of some sort, but nothing definite about the shape and size of these objects could be ascertained because of the poor condition and small size of the fragments, which consisted entirely of corrosion products. Since the original quantitative composition of ancient metals cannot reliably be determined from exact analyses of their corrosion products, only qualitative tests were made. These tests established the identity of the original metals with considerable certainty.

FRAGMENT 1

The immediate find spot of this fragment was given by Dupree as, "Cut 1, brown level over red earth, i.e. Chalcolithic?" It was a thin, slightly concave-convex fragment having an average thickness of about 2 mm., and was roughly rectangular in shape, the length of its longest side being 29 mm. Its weight was 4.7 grams. This was the best preserved fragment in the group. Cuprous oxide and stannic oxide were found to be the principal corrosion products present, the first being in considerably higher proportion. Some basic cupric chloride was also present, mostly on the exterior. Traces of hydrated ferric oxide were found, but this may have come from the soil rather than from the original metal. No corrosion products of lead could be detected. These findings indicate that the original metal was a simple tin bronze that contained little or no lead. Bronzes of this composition are usually early in date, for nearly all late ancient bronzes contain appreciable proportions of lead.

FRAGMENTS 2 AND 3

The immediate find spot of these two fragments was given by Dupree as "Cut 1, Chalcolithic?" Since these two fragments fitted together exactly, it was obvious that they formed two parts of a single original fragment. The combined fragment had the form of a piece of rod of rectangular cross section, its dimensions being about 27 × 7 × 5 mm. Its weight was only 2.5 grams. Its qualitative composition was found to be identical with that of Fragment 1, which indicates that the original metal was also a simple tin bronze, probably of early date.

FRAGMENTS 2 TO 9 INCLUSIVE

The immediate provenance of all these fragments was given as, "Cut 1 b, early Islamic, *ca.* tenth century A.D." They were all in the form of fragile, irregular lumps of rusted iron of various sizes and weights. The largest fragment weighed about 9 grams and the smallest about 0.1 gram. All were found to be composed almost entirely of hydrated ferric oxide. Small amounts of siliceous matter and traces of carbon were found. The composition and lamellar structure of these fragments indicated that the original metal was very probably a wrought iron.

CHEMICAL EXAMINATION OF METAL ARTIFACTS FROM AFGHANISTAN

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This is a report of the results of my examination of metal artifacts excavated at Snake Cave and other sites in 1965 and 1966. Most of them were completely corroded parts or fragments of various objects. Only two were largely composed of unaltered metal. A few more contained remnants of metal. However, it was possible to determine, at least qualitatively, the original metallic composition of all these artifacts. The results are grouped under the following principal headings in accordance with original composition.

COPPER

A. Serial No. 6. Snake Cave, June 28, 1965: Cut 41: Loess: 210–230 (Early Iron Age)

This artifact was a roughly oval disc (1.2 × 0.9 cm.) containing some uncorroded metal. On one side there appeared to be faint traces of some design, and on the other a slightly elevated central boss. These traces of design may indicate that the original object was a coin. Since this artifact weighed only 0.73 gram, all of it was taken for analysis. The results of the analysis are shown in table 2. These results indicate that the original metal was a nearly pure copper obtained by smelting, not by the working of native copper. The sulfur found by analysis was very probably not in the original metal but was in the form of copper sulfide in the corrosion products. This copper sulfide was probably produced by the action of ground water containing sulfide on the normal corrosion products of copper. A much higher proportion of sulfur was found in the next artifact. The various nonmetals estimated by difference consist in large part of the oxygen and carbon of the corrosion products.

B. Serial No. 9. Snake Cave: Cuts 5, 6: Nomadic levels: Upper loess (Early Iron Age)

The material designated by this serial number was in the form of lumps and small fragments which had the appearance of being the end result of the complete corrosion of folded sheet metal or crushed tubing. Their total weight was 5.0 grams. One of the larger lumps was taken for analysis. The results of the analysis are shown in table 3. These results indicate that the original metal was an impure copper obtained by smelting. The sulfur was in the form of copper sulfide in the corrosion products and was probably formed in the way above stated. Sulfur in such high proportion could not have been an original component of the metal.

LOW-TIN BRONZE

A. Serial No. 3. Snake Cave: June 27, 1965: Cut 4k: Upper loess (Chalcolithic?)

This artifact consisted of three fragments of completely corroded sheet metal. Remains of an embossed design were visible. One of the fragments

TABLE 2

ANALYSIS OF COPPER ARTIFACT A

Component	Percentage
Insoluble siliceous matter (loess)	1.42
Copper	86.20
Iron	0.10
Nickel	0.03
Zinc	0.10
Tin, lead, silver, gold	none
Sulfur	1.10
Various nonmetals (by difference)	11.05

Approximate original composition

Metal	Percentage
Copper	99.74
Iron	0.11
Nickel	0.04
Zinc	0.11

TABLE 3

ANALYSIS OF COPPER ARTIFACT B

Component	Percentage
Insoluble siliceous matter (loess)	1.80
Copper	60.58
Iron	0.67
Nickel	0.01
Tin, lead, zinc, silver, gold	none
Sulfur	4.59
Various nonmetals (by difference)	32.35

Approximate original composition

Metal	Percentage
Copper	98.89
Iron	1.10
Nickel	0.01

was selected for analysis and prepared by scraping off as much adherent soil as possible. The results of the analysis are shown in table 4. These results indicate that the original metal was a low-tin bronze containing no lead. Numerous analyses have shown that bronze of such composition is characteristic of an early stage in the use of bronze in Western cultures. It would now appear, in view of the stratigraphic evidence for an early date, that this may also be true for Afghanistan. As to the embossed design apparent on this artifact, the composition of the metal shows that it was soft enough to have made possible the production of the design by hammering, especially if the metal were heated. The most likely way by which the design could have been produced would have been to place the sheet metal on some soft material such as wood and to form the design by hammering with a metal tool. It seems less likely that it could have been produced by hammering the sheet metal on a hard mold of some sort, such as a stone mold, for this works well only with a very soft metal. That the embossed design was formed by casting seems unlikely because of the thinness of the metal.

B. Serial No. 21. Darra-i-Kur, July 4, 1966: Cut 7s: 300 ("Goat Cult" Neolithic)

This artifact was in the form of two pieces of wire or two pieces of a pin. One piece was 1.8 cm. long, the other 1.3 cm. long, and both had a diameter of about 0.3 cm. It seems likely that the two pieces were once part of the same object. They were completely corroded and were coated with encrusted soil. Both pieces were taken for analysis after removing as much adherent soil as possible by scraping. The results of the analysis are shown in table 5. These results show that the original metal was a low-tin bronze containing a small proportion of lead. The proportion is small enough to indicate that the presence of the lead was accidental.

TABLE 4

ANALYSIS OF LOW-TIN BRONZE ARTIFACT A

Component	Percentage
Insoluble siliceous matter (loess)	2.61
Copper	68.32
Tin	5.15
Iron	0.17
Nickel	0.01
Lead, zinc, silver, gold	none
Various nonmetals (by difference)	23.74
Approximate original composition	
Metal	**Percentage**
Copper	92.76
Tin	6.99
Iron	0.23
Nickel	0.02

TABLE 5

ANALYSIS OF LOW-TIN BRONZE ARTIFACT B

Component	Percentage
Insoluble siliceous matter (loess)	0.25
Copper	70.98
Tin	4.91
Lead	0.65
Iron	0.07
Nickel	0.01
Zinc	0.03
Silver, gold	none
Various nonmetals (by difference)	23.10
Approximate original composition	
Metal	**Percentage**
Copper	92.60
Tin	6.41
Lead	0.85
Iron	0.09
Nickel	0.01
Zinc	0.04

C. Serial No. 15. Darra-i-Kur: Cut LC II: 200 ("Goat Cult" Neolithic)

This object was in the form of a tapered rectangular rod broken off at one end and having a conical tip at the other. Its overall length was 12.5 cm. and the cross section at the broken end measured 0.8 × 0.6 cm. It tapered very gradually to the tip which measured 1.0 cm. in length. This object had the appearance of an ornamental spike, or part of an ornamental spike. It was coated with a rough green patina which was underlain with a thin layer of cuprite (cuprous oxide). Of the copper and bronze artifacts submitted for examination, this is the only one found to be largely composed of original metal. The sample for the main analysis was sawn off from the broken end and the patina was removed with a file. The appearance and behavior of the metal on sawing and filing showed that it was a soft bronze. A slight amount of internal corrosion in the form of oxides was apparent. The sample cleaned for analysis weighed 1.6565 grams. Another similar sample was taken in order to test the metal for sulfur and to confirm the percentages of the main components found on the analysis of the first sample. The results of the analysis are shown in table 6. These results show the metal to be a low-tin bronze containing almost half as much lead as tin. That the lead was an intentional component is very probable. The good state of preservation of this object is explained, at least in part, by the composition of the metal, for bronze of this composition is known to be resistant to corrosion in the ground.

TABLE 6

ANALYSIS OF LOW-TIN BRONZE ARTIFACT C

Component	Percentage
Copper	90.44
Tin	5.23
Lead	2.56
Iron	0.17
Nickel	0.08
Silver	0.08
Zinc, gold, sulfur	none
Oxygen (by difference)	1.44

HIGH-TIN BRONZE

A. Serial No. 5. Snake Cave, August 25, 1965: Cut 4: Upper gravels (Early Iron Age)

This artifact was in two completely corroded flat pieces, each slightly thickened along one edge. Since they joined exactly, it was obvious that they were once part of a single object. From their curvature along the thickened edges and from the way they fitted together, it was also obvious that they came from the outer part of a flat circular object that had a raised rim. One of the pieces weighed 3.2 grams and the other 1.7 grams. The smaller piece was selected for analysis, and was prepared by scraping off as much adherent soil as possible. The results of the analysis are shown in table 7. These results indicate that the original metal was a bronze containing a high proportion of tin and no lead. Its composition is very close to that of the eutectic alloy of copper and tin, which is the alloy that has the lowest melting point of any alloy of these two metals. The proportion of tin in the eutectic alloy is 26 per cent. Bronze of this composition is white and highly reflective when polished.

TABLE 7

ANALYSIS OF HIGH-TIN BRONZE ARTIFACT A

Component	Percentage
Insoluble siliceous matter (loess)	0.21
Copper	56.32
Tin	18.94
Lead	0.01
Iron	0.01
Nickel	0.01
Zinc, silver, gold	none
Various nonmetals (by difference)	24.50

Approximate original composition

Metal	Percentage
Copper	74.82
Tin	25.15
Lead	0.01
Iron	0.01
Nickel	0.01

Because of these properties this alloy is very suitable for mirrors. By reason of shape and metallic composition it seems very likely that the original object was a mirror, or, if not that, an ornamental object of some sort, for bronze of this composition is too brittle to be suitable for tools or weapons. Because of this property and the hardness of the alloy this object could not have been made by any other method than casting. The same conclusion as to restriction of use and method of manufacture holds for all the other artifacts in this group.

B. Serial No. 1. Snake Cave, June 30, 1965: Cut 5n: Lower loess, Upper gravels (Early Iron Age)

This also consisted of two completely corroded flat pieces that joined exactly. However, these pieces were much smaller and there was no indication of the form of the original object. The adherent soil was scraped off completely from one of the pieces in order to prepare it for analysis. When cleaned its weight was 0.6462 gram. The results of the analysis are shown in table 8.

C. Serial No. 2. Snake Cave, August 24, 1965: Cut 6r: 200 (Early Iron Age)

This also was in two pieces, but unlike the two previous artifacts the two pieces did not fit together. Both were curved and completely corroded. The larger piece, weighing 6.0 grams, was thickened along one edge, and was apparently part of the rim and side of a cup, or object of similar shape. The other piece weighed 1.5 grams. Though designated as part of a bracelet, this piece had the same curvature and the same diameter as the thickened rim of the first piece, which indicated that it was part of the rim of the same cup-shaped object. Samples from both pieces were cleaned and analyzed. The results of the analyses are shown in table 9. The composition of the larger

TABLE 8

ANALYSIS OF HIGH-TIN BRONZE ARTIFACT B

Component	Percentage
Copper	52.00
Tin	19.28
Iron	0.14
Nickel	0.01
Lead, zinc, silver, gold	none
Various nonmetals (by difference)	28.57

Approximate original composition

Metal	Percentage
Copper	72.80
Tin	26.99
Iron	0.20
Nickel	0.01

piece is listed under (*a*) and that of the smaller piece under (*b*). It will be seen that, although the two pieces differ considerably in composition, there is not much difference between the calculated compositions of the original metal of each. This discrepancy can be explained as being due to differences in the nature and proportion of the corrosion products in the two pieces, differences that were probably caused by different soil conditions during burial. Only slight differences in these conditions acting over the years would account for the differences in the corrosion products. In view of the errors inherent in calculating the composition of original metal from the composition of corroded objects, the agreement of the calculated compositions is close enough to indicate that the metal of the two pieces had essentially the same composition. This supports the visual observation that the two pieces came from the same object.

D. Serial No. 18. Snake Cave: Cut 1: (Later Iron Age)

This artifact appeared to be the completely corroded remains of a rod or piece of rod. It was 2.3 cm. long and about 0.3 cm. in diameter. The entire object was scraped clean and analyzed. The results of the analysis are shown in table 10. These results indicate that the original metal contained nearly 30 per cent tin, the highest found for any artifact in this group. Unusual also is the absence of nickel, which is almost invariably present in ancient bronze. However, it may have been present in too low a proportion to be measured by the method of analysis used. The sulfur was probably in the form of copper sulfide formed by the action of ground water.

TABLE 9

ANALYSIS OF HIGH-TIN BRONZE ARTIFACT C

Component	Percentage (*a*)	Percentage (*b*)
Copper	51.56	56.84
Tin	19.63	20.02
Lead	none	0.02
Iron	0.10	0.11
Nickel	0.01	0.01
Zinc, silver, gold	none	none
Various nonmetals (by difference)	28.70	23.00
Approximate original composition		
Component	Percentage (*a*)	Percentage (*b*)
Copper	72.42	73.82
Tin	27.43	26.00
Lead	none	0.03
Iron	0.14	0.14
Nickel	0.01	0.01

TABLE 10

ANALYSIS OF HIGH-TIN BRONZE ARTIFACT D

Component	Percentage
Copper	48.19
Tin	20.54
Iron	0.08
Lead, nickel, zinc, silver, gold	none
Sulfur	1.39
Various nonmetals (by difference)	29.80
Approximate original composition	
Metal	Percentage
Copper	70.03
Tin	29.85
Iron	0.12

E. Serial No. 20. Snake Cave, August 21, 1965: Cut 5n: Loess above upper gravels (Early Iron Age)

This artifact was a completely corroded amorphous fragment that weighed only 0.01 gram. Because of its small weight a quantitative analysis was not attempted. Qualitative tests indicated that this fragment contained a high proportion of tin. The original metal probably had a composition similar to that of the other artifacts in this group.

IRON

The iron artifacts can be divided into two distinct groups, those in which some metal remained and those which were completely corroded. In all the artifacts of the first group, the metal was found to be wrought iron, as shown by its malleability when isolated, and by the fact that this malleability was unchanged on heating to redness and plunging into cold water. Since little or no carbon was detected in the corrosion products of the artifacts of the second group, it seems very likely that these also were originally composed of wrought iron.

Group 1

A. Serial No. 8. Snake Cave: Cuts 5, 6: Nomadic levels; Upper loess (Early Iron Age)

This was a narrow irregular object 5.2 cm. long weighing 7.6 grams. It contained a large proportion of uncorroded metal, in fact a larger proportion of metal than any other artifact except low-tin bronze C (Serial No. 15). The corrosion products appeared as a hard thin layer on the surface only. However, it is possible that this was originally a larger object and that most of the corrosion products had disappeared. Nevertheless, the survival of such a large proportion of wrought iron in a small object found in soil is remarkable. This is an indication that the iron is exceptionally pure or that the soil conditions were

exceptionally favorable. Wrought iron that is not exceptionally pure may survive in extremely dry soil without being much corroded. The shape of this artifact suggests that it may have been a crude arrow point.

B. Serial No. 16. Snake Cave: Cut 1: Brick level (Later Iron Age)

The two thin artifacts designated by this serial number were very probably once part of the same object. Both were heavily coated with rust. The larger piece was roughly rectangular and measured 4.5 × 2.0 cm. The irregular smaller piece weighed only 0.5 gram. Its shape indicated that it was once attached to the larger piece. On cleaning, the latter was found to have a substantial core of malleable uncorroded iron. The wedge-shaped cross section of this core and the presence of a short remnant of a tang showed that the original object was a knife of some kind. The smaller piece also contained a thin core of malleable iron. The fact that another iron artifact (No. 17) and a bronze artifact (No. 18) from the same level were completely corroded indicates that the survival of the metallic iron in this artifact is due primarily to the high purity of the metal.

C. Serial No. 22. Hazar Gusfand, July 5, 1966: Cut 1c: 0–50 (Later Iron Age?)

Although two pieces were designated by this serial number, only one was found to be an artifact. The other appeared to be a stone heavily coated with corrosion products of iron. This artifact was 4.5 cm. long and 0.2 to 0.3 cm. thick. Its weight was 4.0 grams. It had the appearance of a heavily rusted curved knife blade with a small right-angled tang opposite the pointed end. On cleaning, the skeleton of a metallic core of the same shape was isolated.

D. Serial No. 4b. Snake Cave, August 22, 1965: Cut 6r: 130: Loess above gravels (Later Iron Age)

This was a rough rodlike fragment with a small lug at one end. Its length was 3.7 cm. and it weighed 4.2 grams. It consisted largely of the usual corrosion products of iron, but a few small fragments of metal were scattered through the middle. There was no clue as to identity of the original object.

E. Serial No. 4c. Snake Cave, August 22, 1965: Cut 6r: 130: Loess above gravels (Later Iron Age)

This artifact had the appearance of a rough, tapered, slightly curved rod. Its length was 4.5 cm. and its weight 3.0 grams. On cleaning, it was found to have a core of malleable iron. The shape of both artifact and core suggested the remains of the end of a coarse curved needle.

F. Serial No. 4d. Snake Cave, August 22, 1965: Cut 6r: 130: Loess above gravels (Later Iron Age).

This was almost entirely an irregular lump of iron corrosion products. Its weight was 8.5 grams. A small fragment of malleable iron was found in the center.

G. Serial No. 7. Snake Cave, June 27, 1965: Cut 5: Upper loess (Later Iron Age)

This artifact had the appearance of a rough rod heavily coated with iron corrosion products and soil. It was 4.0 cm. long and weighed 2.5 grams. It contained a compact core of corroded iron having the shape of a thin bar or strap. A central streak of uncorroded metal was present in this core.

Group II

A. Serial No. 4a. Snake Cave, August 22, 1965: Cut 6r: 130: Loess above gravels (Later Iron Age)

Before cleaning, this artifact had the appearance of a narrow mass of corrosion products. Its length was 8.5 cm. and it weighed 28.7 grams. By cautious removal of the outside layers of soil and rust it was found to have a core in the shape of a fluted triangular arrow point. No iron could be detected in this core by magnetic tests. Since it was desirable to preserve this core intact no destructive tests were made.

B. Serial No. 10. Snake Cave, August 30, 1965: Cut 3g: 430 (Early Iron Age)

This artifact was in the form of a gradually tapering bar or thick strap that was square at each end. It was 9.8 cm. long and weighed 45.0 grams. Examination of a cross section showed that the outside layer of loose rust was thin and that the artifact was mostly composed of a compact and dense core of completely oxidized iron. The shape of this artifact suggests that the original object may have been a long flat arrow or spear point.

C. Serial No. 11. Snake Cave, June 26, 1965: Cut 5m: 140–220 (Later Iron Age)

This was a flat narrow artifact that was rounded at one end and had a blunt point at the other. One side was nearly straight and the other side irregular. Its length was 6.0 cm. and its weight, including a considerable coating of soil, was 12.0 grams. Examination of a sample taken from near one end revealed a compact core of corroded iron that was roughly rectangular in cross section. The shape of this artifact suggests that the original object was an arrow point.

D. Serial No. 12. Snake Cave, June 27, 1965: Cut 5m: 250 (Early Iron Age)

This was a roughly rectangular lump 3.5 cm. long that weighed 7.5 grams. Removal of a heavy crust of corrosion products revealed a compact core of oxidized iron that was rectangular in cross section. The shape of this core suggests that the original object, or some part of one, was a flat bar or strap.

E. Serial No. 13. Snake Cave, August 24, 1965: Cut 6q: 200 (Early Iron Age)

This was a flat narrow artifact 6.3 cm. in length. It weighed 15.0 grams before cleaning and 11.5 grams after removal of a heavy crust of soil. Examination revealed the presence of a very thin compact core of oxidized iron that was wedge-shaped in cross section. The shape of the core suggests that the original object was a knife blade.

F. Serial No. 14. Snake Cave, September 1, 1965: East face cave-in: Cuts 4, 5 (Later Iron Age?)

This was an irregular lump that weighed 12.0 grams. The outer layers consisted of a soft mass of corrosion products and soil which contained organic fibers, apparently wood fibers. It contained a hard core of oxidized iron that had the form of a thin bar. Apparently this artifact was the remains of a wood handle that contained the oxidized tang of some tool or weapon, such as a knife.

G. Serial No. 17. Snake Cave: Cut 1: Brick level (Later Iron Age)

This small straight artifact of round cross section appeared to be an oxidized nail or rivet, more likely the latter since it was slightly thickened at each end. It was 2.2 cm. long and weighed only 0.8 gram.

H. Serial No. 19. Horse Cave: Cut 1a: 0–50 (Early Islamic)

This artifact appeared to be about a third of an oxidized ring of round cross section with a small lug on the outside near one end. It weighed 2.0 grams. Probably the original object was an iron ring with some sort of attachment.

SUPPLEMENTAL COMMENTS

From the standpoints of archaeology and the history of ancient metallurgy perhaps the most interesting of all these artifacts are those that were originally composed of high-tin bronzes. It is unfortunate that no specimens of the uncorroded alloys were available for analysis, and that the data on the original composition of the alloys had to be calculated from the composition of completely corroded objects.

TABLE 11

PERCENTAGES OF CERTAIN KEY METALS IN HIGH-TIN BRONZES OF CHINA

Object	Period	Tin	Lead	Nickel
Blade	Chou Dynasty[1]	16.59	12.74	0.10
Chariot fitting	" "	17.51	12.04	0.12
Handle	" "	19.25	0.29	0.15
Ceremonial vessel	" "	19.33	0.24	none
Spear	" "	19.84	9.54	none
Mirror	Han Dynasty	25.56	6.46	0.33
"	" "	25.85	4.00	0.05
"	" "	25.98	4.20	0.10
"	" "	26.55	4.71	0.11
"	" "	27.00	4.55	0.09

[1] Some possibly earlier.

Such calculations always involve some uncertainty because of the possibility that the corrosion products of individual metals of an alloy may have been dissolved or washed away differentially by ground water with the result that the ratios of the metals in the corrosion products become different from those in the uncorroded alloy. Changes of this sort are especially likely to occur when the corrosion products of an object are loose and porous. Fortunately, all the artifacts that were originally composed of high-tin bronzes were very hard and compact. By reason of this, the calculated compositions of the alloys are probably not far from the truth.

High-tin bronzes were widely used in ancient China, and it is therefore tempting to infer that China was the source of the high-tin bronzes of ancient Afghanistan. However, there are some marked differences between the compositions of the high-tin bronzes from these two regions. In table 11 are shown percentages of certain key metals in representative high-tin bronzes from China,[49] and in table 12 the calculated percentages of these same key metals in the original objects from Afghanistan. The differences are obvious. It will be seen that the percentages of tin in the Chinese objects, other than the mirrors, are decidedly lower than in the objects from Afghanistan, only one of which was probably a mirror. Lead is

TABLE 12

CALCULATED PERCENTAGES OF CERTAIN KEY METALS IN HIGH-TIN BRONZES OF AFGHANISTAN

Artifact	Tin	Lead	Nickel
A (Serial No. 5)	25.15	0.01	0.01
B (Serial No. 1)	26.99	none	0.01
Ca (Serial No. 2)	27.43	none	0.01
Cb (Serial No. 2)	26.00	0.03	0.01
D (Serial No. 18)	29.85	none	none

[49] The data in table 11 were taken from analyses made in the author's laboratory by Mrs. In Soon Moon Chang.

invariably present in the Chinese objects, often in considerable proportion, but absent or in very low proportion in those from Afghanistan. The percentages of nickel are generally much higher in a relative sense in the Chinese objects, though in two of them this metal was apparently absent, as it was in one of the objects from Afghanistan. Since the nickel on ancient bronze is always associated with the copper this may indicate a common source of copper for certain of the bronzes from China and Afghanistan, but it seems certain that the bronzes themselves did not have a common origin. In fact, the high-tin bronzes of Afghanistan appear to be unique in their composition, for no ancient alloys of like composition are known from elsewhere. The logical conclusion is that they were made locally.

REPORT ON CHEMICAL ANALYSES OF SOME GLASSES FROM AFGHANISTAN

ROBERT H. BRILL

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A group of ten fragments of excavated glass was submitted by Professor Dupree to the Corning Museum of Glass for analysis and examination. The fragments came from three different sites and are thought to range in date from as early as 300–400 A.D. to the Early Islamic Period. Although most of the pieces are clearly vessel fragments, the sizes and shapes preserved are inadequate for making stylistic attributions or comparisons to objects of other origins. Descriptions of the individual fragments are given in the attached catalog.

The samples were analyzed as part of a continuing analytic survey of early glasses being carried out by the museum. Two types of analyses were made. The first were spectrographic analyses, which yielded semi-quantitative information on the trace-element concentrations as well as on the major and minor elements. These were followed by wet chemical analyses of nine of the specimens. These analyses, done by the atomic absorption technique, yielded quantitative data on the major elements and certain selected minor elements. All the analyses were carried out by Dr. R. H. Bell and Mr. C. A. Jedlicka of Lucius Pitkin, Inc., New York City.

The analyses were undertaken primarily because only few analytical data are available at present on glasses excavated in Afghanistan. E. V. Sayre[50] has published analyses of some glasses found at Begram, which are generally regarded as having been imported from the West, possibly from Syria; and qualitative spectrographic analyses of eighteen glasses from Shamshir Ghar were published earlier by Professor Dupree.[51] The small number of samples analyzed in our study cannot, of course, be construed as being representative of glasses made in or used in Afghanistan in early times, but as is so often the case, these happen to be the only specimens readily available for study and therefore they were analyzed in the hope that they will be of some help in opening up a more comprehensive study.

It can be seen from the table of data that all of the glasses except one are of a soda-lime-silica (Na_2O:CaO:SiO_2) type, but with high enough levels of potash (K_2O) and magnesia (MgO) that one might more accurately classify them as Na_2O-K_2O:CaO-MgO:SiO_2 glasses. The potash and magnesia values are quite important for understanding the origins of these glasses. This can best be discussed by reviewing first the potash-magnesia compositional categories described by Sayre and Smith.[52]

Drawing upon a series of chemical analyses of ancient glasses representing a wide variety of dates and provenances, Sayre and Smith have separated early glasses into two categories. The first is a category containing low concentrations of both K_2O and MgO (0.1–1.0 per cent and 0.5–2.5 per cent, respectively), while the second contains relatively high concentrations of these oxides (1–4 per cent and 3–9 per cent). Sayre's findings have been borne out by many dozens of independent analyses carried out elsewhere, for example, at the Corning Museum of Glass. Both of these categories of glass have soda (Na_2O) as the major alkali in the glass with K_2O and MgO as minor components. It should be emphasized that these glasses are distinctly different from those medieval glasses in which the major alkali ingredient is K_2O, and the Na_2O is a minor ingredient.

Since most glasses found in "eastern" sources, and presumably most of the glasses made in these regions, fall in the high K_2O—high MgO category, it is not surprising to find (as can be seen in table 13) that our specimens from Afghanistan are also rich in K_2O and MgO. The single exception, No. 1358, falling within the low K_2O—low MgO category, can reasonably be assumed to have been imported from a source other than those which provided the rest of the glasses.

The K_2O contents, however, are even greater than those usually found in the high K_2O—high MgO category. These values range from 2.50 to 6.94 per cent, with five of the nine glasses exceeding the level of 4.0 per cent, whereas Dr. Sayre only rarely found a K_2O content exceeding 4.0 per cent. A completely independent check of one of these analyses was made by another analyst, William Passmore of Corning Glass Works, and his results were essentially in agreement with those previously determined. Therefore, we have confidence that the high K_2O results are valid.

The picture then may be reduced to this. We have found one glass (No. 1358) which is of the low K_2O—low MgO type; three glasses (Nos. 442, 1359, and 1360) which could be of the usual high K_2O—high MgO type; and five glasses which seem too rich in K_2O to fit into the usual high K_2O—high MgO category. Consequently, we must look elsewhere for glasses with compositions resembling those of (at least) the five glasses last mentioned.

[50] Sayre, 1964.

[51] Dupree, 1958.

[52] Sayre and Smith, 1961, 1962.

TABLE 13

CHEMICAL ANALYSES OF GLASSES FROM AFGHANISTAN

			441	442	1356	1358	1359	1360	1361	1365	1367	1366[c]
Silica	SiO_2	*b*	~62	~53	~62	~68	~64	~58	~62	~57	~62	~65–70
Sodium oxide	Na_2O	*a*	15.8	19.2	17.0	20.1	18.2	17.3	19.8	17.1	19.0	17–20
Calcium oxide	CaO	*a*	6.54	11.8	6.06	6.58	4.30	7.46	6.22	4.20	4.78	7–10
Potassium oxide	K_2O	*a*	5.66	3.90	6.94	1.06	2.50	3.80	4.74	5.46	4.88	~1.0
Magnesium oxide	MgO	*a*	2.82	3.72	2.64	0.63	4.54	6.64	3.02	5.26	3.66	~0.5
Aluminum oxide	Al_2O_3	*a*	3.14	5.58	3.34	2.78	4.21	2.92	1.33	7.85	3.09	2–3
Iron	Fe_2O_3		2.0	2.5	1.1	0.25	1.7	1.5	1.5	1.8	1.0	0.8
Titanium	TiO_2		0.10	0.15	0.08	0.05	0.08	0.04	0.05	0.08	—	—
Manganese	MnO		0.05	0.05	0.03	0.05	0.07	0.10	0.5	0.5	0.4	0.1
Antimony	Sb_2O_5		<0.01	—	—	—	—	—	—	—	—	0.40
Copper	CuO		0.91[a]	<0.01	—	—	—	1.67[a]	0.01	<0.01	0.10	<0.01
Lead	PbO		0.5	<0.01	—	—	—	0.38	<0.01	—	—	—
Silver	Ag_2O		0.001	<0.001	—	—	—	0.003	<0.001	—	—	—
Tin	SnO_2		0.06	<0.01	—	—	—	0.08	<0.01	—	—	—
Boron	B_2O_3		0.02	0.03	0.01	0.02	0.04	0.02	0.01	0.02	—	—
Barium	BaO		<0.01	0.01	<0.01	—	—	—	0.01	0.01	0.01	<0.01
Strontium	SrO		0.05	0.02	0.05	0.02	0.02	0.05	0.03	—	—	—

a – Atomic absorption determinations by R. H. Bell and C. A. Jedlicka, of Lucius Pitkin, Inc., New York City. All other values are spectrographic analyses by the same analysts.
b – SiO_2 estimated by difference.
c – Insufficient sample, spectrographic results only.
— – Same as preceding value to left in row.
< – Less than.
~ – Approximately.

Elements sought but not found at the limits shown:

NiO	0.01	As_2O_5	0.01
V_2O_5	0.01	ZrO_2	0.01
Cr_2O_3	0.01	Li_2O	0.01
ZnO	0.01	Rb_2O	0.01
Bi_2O_3	0.001	P_2O_5	~1
CoO	0.01		

One need not look far for such glasses. A. A. Abdurazakov and M. A. Besborodov have published many analyses of early glasses from Central Asia. Among about 130 analyses they reported, are perhaps 40 glasses which have K_2O and MgO contents which are comparable to those we have found, that is to say, glasses with K_2O contents greater than 4.5 per cent and MgO values between about 2.5 and 6.5 per cent. These 40 glasses, just as those we analyzed, are glasses in which soda is still the predominant alkali with Na_2O values of approximately 13–19 per cent. (There is another class of compositions in which the K_2O and Na_2O concentrations are about the same, both being at levels of approximately 6–9 per cent.)

The "comparable" glasses reported by Abdurazakov and Besborodov all come from Central Asia and date from the eighth to thirteenth centuries, but center mainly around the eleventh century. Some of the excavation sites are near Tashkent, Samarkand, Bukhara, Fergana, and Dzhambul. The center of this region is some 400 km. to the north of Snake Cave and the other sources of our specimens, and they could very well have a common origin.[53]

Variations in the K_2O and MgO contents of glasses from this part of the world probably result from variations in the compositions of the plant ashes which we believe were used as alkali sources. (This topic and some of its ramifications will be discussed in detail in a forthcoming publication.[54]) Therefore, it seems reasonable to infer that the K_2O-MgO rich glasses found among these analyses are part of a Central Asian glassmaking tradition characterized by this compositional feature. Whether our particular glasses were made in Afghanistan or were imported from elsewhere in Central Asia, for example from the Tashkent region, remains an open question, and one of some interest.

We shall not discuss in detail the minor- and trace-

[53] See especially Adburazakov and Besborodov, 1966; Abdurazakov, Besborodov, and Zadneprovsky, 1963; Besborodov and Abdurazakov, 1964; Besborodov and Zadneprovsky (ed. by Levey), 1967.

[54] Oppenheim, Barag, von Saldern, and Brill, in press.

element concentrations, because of the small numbers of samples involved, but two observations should be noted in passing. Only one of the glasses (No. 1366) was found to contain antimony oxide, Sb_2O_5. At a level of 0.40 percent, this should be considered an intentional additive. Because antimony is not ordinarily found in glasses dating from later than about 300–400 A.D., one is inclined to place the date of manufacture of this glass somewhat earlier than indicated by its stratigraphy. This fragment was too small to be used for a quantitative analysis, so we have only spectrographic information on the K_2O and MgO contents, but this information proves that the glass is a member of the low K_2O—low MgO category, as is No. 1358.

Three of the glasses, Nos. 1361, 1365, and 1367, contain sufficient concentrations of manganese to place them just above the usual level constituting a probable intentional additive (*ca.* 0.3 per cent MnO). However, one hesitates to conclude that this is necessarily so with these particular glasses, since most of Besborodov's glasses contain at least this much MnO and it may have been introduced with the plant ash ingredient.

A second observation is that glasses Nos. 441 and 1360 contain additive amounts of copper as a colorant (CuO = 0.91 per cent and 1.67 per cent, respectively). In the case of No. 1360 the blue-green color is more or less what one expects from this copper content, particularly with the rather high iron content, but in No. 441 the blue color has been modified somewhat to an emerald green by the presence of lead. These colors resemble glasses made in the Late Roman and Islamic times elsewhere. The CuO contents are correlated with tin, lead, and silver contents which implies the probable use of bronze or bronze corrosion products as the source of the copper-colorant for these glasses.

It is unfortunate that the fragments recovered were not larger or more indicative of the shapes of the parent objects, for it would have been very interesting to see how they might have compared stylistically with those analyzed by Abdurazakov and Besborodov. Perhaps future excavations will enable us to gain further insight into the history of glasses found in Afghanistan.

CATALOG OF GLASS SAMPLES ANALYZED

CMG No.

441 Small fragment of emerald green glass. Snake Cave, Aq Kupruk I, Cut 1a:50-100. July 14, 1962. *ca.* 500–600 A.D. (Later Iron Age).

442 Rim fragment of glass vessel. Snake Cave, Aq Kupruk I, Cut 2e:#1001. July 16, 1962. *ca.* 300–400 A.D. (Early Iron Age).

1356 Goblet or lamp stem of pale yellowish-green glass, heavily weathered. (Orange weathering crust with black flakes.) Snake Cave, Aq Kupruk I, Cut 6r, 7s (1/2):300. August 28, 1965. *ca.* 300–400 A.D. (Dupree No. 1) (Early Iron Age).

1358 Small irregular fragment of pale amber glass, slightly iridescent. Snake Cave, Aq Kupruk I, Cut 5n:200. August 25, 1965. *ca.* 300–400 A.D. (Dupree No. 3) (Early Iron Age).

1359 Small wall fragment of blown vessel. Aqua-green glass, little or no weathering, filled with flattened bubbles. Snake Cave, Aq Kupruk I, Cut 1a:0-20. July 13, 1962. Early Islamic (pre-thirteenth century A.D.) (Dupree No. 7).

1360 Small rim fragment of blown vessel. Deep blue-green transparent glass, little or no weathering. Snake Cave, Aq Kupruk I, Cut 1a:0-20. July 13, 1962. Early Islamic (pre-thirteenth century A.D.) (Dupree No. 7—second specimen).

1361 Base fragment with pontil mark, of small vessel. Pale green glass with seeds and stones, many incipient cracks. Snake Cave, Aq Kupruk I, Cut 5o:200. August 25, 1965. *ca.* 300–400 A.D. (Dupree No. 8) (Early Iron Age).

1365 Base fragment of small vessel. Olive green glass, little or no weathering. Hazer Gusfand, Cut 3i:80. July 16, 1966. Early Islamic (?) (Dupree No. 5).

1366 Small fragments of *colorless* glass, with heavy weathering. Snake Cave, Aq Kupruk I, Cut 5n:Loess. June 30, 1965. *ca.* 500–600 A.D. (Dupree No. 6) (Later Iron Age).

1367 Small fragment of blown glass, pale green with brownish-pink streaks (probably due to Mn), no weathering. Horse Cave, Aq Kupruk II, Cut 1a:0-50. July 2, 1965. Early Islamic (pre-thirteenth century A.D.) (Dupree No. 9).

A MIDDLE PALAEOLITHIC TEMPORAL BONE FROM DARRA-I-KUR, AFGHANISTAN

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The broken right temporal bone (fig. 135) from the Mousterian level of Darra-i-Kur cave (Cut LC II:200) consists mostly of petrous and tympanic bones, and the mastoid process and paramastoid crest are broken off at their bases. Posteriorly the bone extends around the deep sigmoid sinus groove but lacks the entire masto-occipital suture. Superiorly it reaches the beveled parietomastoid suture internally only at the point of the parietal notch, but the whole squamous plate is missing except for 1 cm. high basal part above the external auditory meatus. Anteriorly the bone is broken away at the root of the zygomatic process and of the temporomandibular joint surface; only the medium long postglenoid process is preserved. Medially a sliver of bone is lacking above the carotid canal's anterior opening, exposing air cells, but probably not detracting from the petrous length measurement. Its size suggests male sex.

The bone shows several individual details of interest. The mastoid emissary foramen (joining the sigmoid sulcus) is at the edge of the break posteriorly but is clearly 3 mm. in diameter. A vertical groove on the outer surface of the bone may connect with this, and another vertical groove may have carried the posterior auricular artery. Laterally the supramastoid crest is mostly broken away, but its lower edge shows almost no projection (as in females); the suprameatal spine is absent and the oval meatus is normal with thick rim (3 mm.). Inferiorly the stylomastoid, jugular and carotid foramina are normal in size and form, the triangular fossa for cranial nerve IX and its foramen (cochlear aqueduct) are sharply defined, the tiny canal in the jugular-carotid ridge for the tympanic branch of IX (Jacobson's nerve) is clear, but only with magnification can I see the tiny canal for the auricular branch of X (Aldermen's nerve) entering the fused tympanomastoid fissure. The styloid process is missing but the sharp-edged and quite high (13 mm.) tympanic plate makes a 3 mm. deep by 6 mm. wide excursion for the styloid process so that this must have been robust. The tympanic bone ends medially in an exceedingly strong scroll-like process

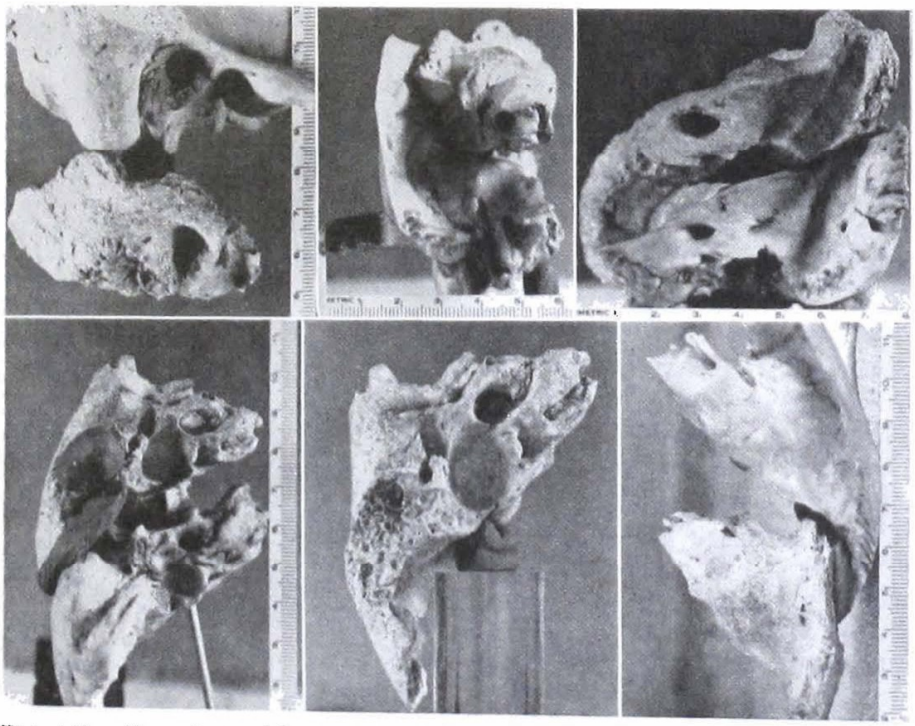

FIG. 135. Five views of Darra-i-Kur Mousterian temporal bone compared with a modern United States male bone. Top left: lateral, showing petrous projecting at petrotympanic. Top middle: anterior, showing Eustachian tube opening. Top right: medial, showing huge internal acoustic meatus. Bottom left: inferior, showing lack of tympanomastoid gap. Bottom middle: inferior, to larger scale, showing space for massive styloid and tympanic scroll next to carotid canal and below Eustachian tube. Bottom right: superior view.

below the narrow Eustachian and tensor tympani semicanal openings. This process in the complete skull lies against the angular spine of the sphenoid for origin of the sphenomandibular section of deep cervical fascia, is as strong as the Darra-i-Kur process in less than 20 per cent of 90 modern bones and very rarely has the scroll-like form. Plausibly this scroll is for a tendon of origin for the levator veli palatini, one of the muscles which helps to open the Eustachian tube to equalize middle-ear and outside atmospheric pressures in altitude change such as occurs in this eastern part of Afghanistan. Another individual peculiarity is an extra long fingerlike extension of the petrous tegmen tympani forward into the medial angle of the fissure between the squamous's postglenoid process and the tympanic plate. This petrous intrusion regularly forms the petrotympanic fissure to transmit the chorda tympani branch of VII and the accompanying anterior ligament of the malleus (a Meckel's cartilage derivative) forward and medially. But an equally large fingerlike extension is rare (less than 5 per cent) in modern man and I have never seen it in Neanderthal man. The superior surface of the Darra-i-Kur petrous shows a barely discernible edge anteriorly for the tegmen tympani (roof of middle ear) where it joins the squamous plate, a very large double hiatus of the facial canal (for greater superficial petrosal branch of VII and superior tympanic or petrosal branch of the middle meningeal artery) and a puffed up expansion of bone over the arcuate eminence for the superior semicircular canal. Clearly this area is well filled with air cells extending from the mastoid antrum to petrous tip.

The most striking peculiarity is on the medial wall of the pyramid where the enormous cavern of the internal acoustic meatus has almost three times the normal cross-sectional area (table 14): 160.6 mm.^{2} as opposed to 62.5 mm.^{2} using πr^2.

The canals for nerve VII and for acoustic (spiral) and vestibular divisions of nerve VIII in the depth of the meatus are normal and not enlarged. The sigmoid sinus groove is deep and wide (12 mm.), the superior petrosal sinus marking is deep and the cleft for the endolymphatic duct and sac is wide. Tympanic cavity and ossicles are normal, with no "notch" on incus.[54a]

The temporal bone of *Homo sapiens neanderthalensis* differs from that of *Homo sapiens sapiens* consistently in several salient details. Several of these I demonstrate in the measurements of table 14. In consonance with its relatively low vault, possibly deformed, and its obtuse basicranial angle the Classic Neanderthal temporal squama is less arched than that of modern man. Four key differences center on the external auditory area[55]: in Neanderthal (1) the glenoid fossa is shallow relative to the articular eminence; (2) the tympanic bone partly retains its original prehuman tubular form, showing only a small vaginal crest lying free and 6–12 mm. in front of the mastoid process, and forming a round or oval meatus relatively wide from front to back and often thick-walled; (3) the mastoid process is small and often pointed medially below the wide skull base; (4) the digastric fossa (mastoid notch) is very large and faces laterally because the paramastoid or occipitomastoid crest which forms its medial wall projects downward more than the mastoid process in a somewhat infantlike and anthropoid manner. This projecting crest Stewart (1961, 1962) correctly labels occipitomastoid since in Neanderthal man and in *Homo erectus* it joins a similar crest formed by the occipital. In 13 Neanderthal skull casts or drawings I measure this crest as projecting 1.2 mm. below the mastoid process, or 3.0 mm. if I omit the 3 Skhul male skulls. In modern man this crest lies equally far above the mastoid tip and is usually separated from the mastooccipital suture by part of the shallow groove for the occipital artery which creates a second and very much smaller crest on the occipital bone. So in modern man there

TABLE 14

MEASUREMENTS OF PETROUS BONE FROM DARRA-I-KUR MOUSTERIAN COMPARED WITH MODERN AND NEANDERTHAL AVERAGES

	Darra-i-Kur Mousterian male(?)	40 Modern U. S. males	Neanderthal composite	N	Standard deviation U. S.
Petrous Pyramid:					
Length	63	60.1	(57.1)	7	3.4
Anterior height	14	14.8	14.4?	5	1.5
Posterior height	22	23.0	21.8	6	2.7
Internal acoustic meatus:					
Height	6.3	3.9	4.4?	5	1.3
Anterior-posterior width	*8.0*	5.0	4.9?	5	1.0
Depth	9.6	8.4	(7.1)	2	1.6
External auditory meatus:					
Height	10	9.6	9.7	15	1.2
Anterior-posterior width	6	7.2	*8.6*	15	1.3
Tympanic length	30	29.8	*33.0*	12	2.5
Stylomastoid inset	11	13.5	*18.3*	12	2.0
Carotid canal diameter	6	6.0	5.8	9	0.8
Tympanomastoid separation	1	1.0	7.7	15	1.6
Mastoid height	(27)	29.2	*23.7*	11	2.9

Note: The Neanderthal series includes casts (or scale drawings) of temporal bones from Ehringsdorf (♂), Le Moustier (♂), La Quina (♀), La Ferrassie (♂), La Chapelle (♂), Gibraltar (♀), Monte Circeo (♂), Krapina (2) (♂), Tabun (♀), Skhul IV, V, VI (♂), Shanidar I (♂), and Teshik Tash (child); for mastoid height I use only males.

Statistically significant deviations from the U. S. male white dissecting-room sample are italicized.

[54a] Arensberg and Nathan, 1971.

[55] Boule, 1923; p. 197–202; Keith, 1920: p. 152–154; McCown and Keith, 1939; p. 248, 257; Stewart, 1961, 1962; Weidenreich, 1943.

is usually a paramastoid or medial digastric crest rather than an occipitomastoid crest. But as Stewart (1961) stresses, one must not confuse this paramastoid crest with the paramastoid process on the jugular process of the occipital which may reach the transverse process of the atlas next to the rectus capitis lateralis muscle. So far as I can determine details of the petrous pyramid (casts of Krapina (2), and Gibraltar, and endocranial casts of La Chapelle, Le Moustier, and Shanidar 1), the internal acoustic meatus is no bigger in Neanderthal than in modern man. I cannot get data on ossicles or tympanic cavity. Darra-i-Kur ossicles I measure as follows: malleus height 8.3 mm., limb length 5.0 mm., head size 2.5 by 1.8 mm.; incus length of short and long limbs each 4.8 mm., spread 6.0 mm., saddle 2.0 by 3.7 mm.; stapes footplate 3.0 by 1.4 mm. and "height" greater than 3.3 mm.

Table 14 shows the position of the Darra-i-Kur temporal bone with reference to modern United States white males and a small Neanderthal sample. Except for its huge internal auditory meatus and a slightly lateral placing of the stylomastoid foramen (opposite of Neanderthal) the Darra-i- Kur specimen is modern. This applies particularly to its flat tympanic bone, not set apart from the mastoid process. When I restore the missing three-fourths of the mastoid process it gives an estimated length of 25–29 mm. This would still not exceed the Neanderthal range. And there is no way to restore either the paramastoid crest or the front part of the temporomandibular joint. Hence I rely almost entirely on the tympanic bone in concluding that the Darra-i-Kur temporal is nearer to modern man than to Neanderthal man.

It is tempting to infer further than the actual evolutionary transition from Neanderthal to modern man had taken place already in some area to the south, such as Sistan or India. The Skhul and Djebel Kafzeh skeletons from Israel (Mount Carmel),[56] probably contemporary with Darra-i-Kur temporal bone show the kind of intermediate and variable state expected if a population of modern form, evolving between 100,000 and 40,000 B.C. in southern Asia, had absorbed a Classic Neanderthal group. But we cannot base this origin area for modern man on the Niah skull alone.[57] We must not forget that the labels Neanderthal and modern each cover a whole array of varying and evolving populations at present inadequately sampled. For example, Swanscombe, Steinheim, and Ehringsdorf, and much later Skhul lack the "typical" Neanderthal occiput. The Darra-i-Kur temporal would fit into a partly Neanderthal population like Skhul just as well as a modern one. In this state of ignorance about man at the end of the Würm interstadial in Southern Asia, I dare not use Darra-i-Kur to pin up an hypothesis of modern intrusion from the south as opposed to one of general rapid evolution from Neanderthal forms to modern over the whole of western Asia.

Finally, I offer the equally unsupported speculation that Darra-i-Kur's increased size of vascular foramina may have a connection with the slight vascular hypertrophy needed at high altitude.

[56] Higgs and Brothwell, 1961.
[57] Brothwell, 1960.

MOLLUSKS FROM PREHISTORIC SITES IN AFGHANISTAN

ALAN SOLEM

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Current knowledge of extant Afghanistan nonmarine mollusks approximates that available concerning mollusks of the American Great Basin in the 1870's. An early report by Ancey (1893) and studies on freshwater mollusks from fringing areas by Annandale and Prashad (1919) are the only pre-1950 significant studies. Jaeckel (1956) summarized early records and reported on material collected by J. Klapperich in 1952 and 1953. I have under current study material collected by the W. S. and J. K. Street Expedition of the Field Museum of Natural History to Afghanistan in 1965. Approximately one-quarter of the material reported in each study represented new generic records for Afghanistan, often involving range extensions of much more than 1,000 miles.

Under these circumstances, the presence of previously unrecorded species and genera in the material from Aq Kupruk has no necessary significance concerning faunal succession and shifts. Two, *Syama* sp. and *Pupilla* (*Gibbulinopsis*) sp., of the nine represent new species in genera previously unrecorded from Afghanistan. They will be described elsewhere. A third species, *Parvatella flemingi*, was previously known only from Kashmir, although another species of the same genus, *Parvatella ghorbandensis* Jaeckel, 1956, has been described from the Ghorband Valley. *Caecilioides bensoni* probably is what Jaeckel (1956: p. 345) recorded as *Caecilioides* sp. *Phenacolimax* (*Oligolimax*) *conoidea* is of uncertain relationship to *P. annularis* (recorded by Jaeckel, 1956, p. 346). *Subzebrinus eremitus*, *Parmacella* (*Kandaharica*) *rutellum*, and *Trichia rufispira* are widely spread in suitable areas of Afghanistan and have been recorded previously. *Zootecus insularis chion* was taken from the surface near Aq Kupruk but was not found in the actual deposits. Its very wide distribution from North Africa to India and great range of variation make it improbable that there is any significance to this absence. There was a previous record from Afghanistan (Jaeckel, 1956, p. 345).

The collection of mollusks from Aq Kupruk was not a random sample from the various levels. Material of the larger species, *Subzebrinus eremitus*, *Trichia rufispira*, *Parvatella flemingi*, and *Syama* sp., were sorted out and partly cleaned by the field crews. Material of *Caecilioides*, *Parmacella*, *Phenacolimax*, and *Pupilla* was found at Field Museum of Natural History in dirt compacted within the apertures of the larger shells. Their abundance is undoubtedly vastly underrepresented in this study. Examples not fortuitously sheltered inside other shells would have been discarded in the field as part of the "excess dirt." The concentration of smaller species in material from Aq Kupruk I reflects the large volume of relatively uncleaned material from these samples and the sharp eyes of a technical assistant, Mrs. Lynda Hanke. The relative absence of these species from Aq Kupruk II probably reflects the lesser numbers of *Trichia* and hence the greatly reduced volume of dirt accidentally shipped for study. The aperture of *Subzebrinus* is much smaller than that of *Trichia* and thus the number of smaller snails would be drastically reduced.

While the raw figures of abundance and occurrence suggest that significant differences and changes have occurred, the bias introduced by rough field sorting with its unintentional neglect of small specimens is sufficient to prevent any significance being attached to the absence of records for the smaller species at most levels. Some data on faunal and climatic changes can be deduced, but this is deferred until after the systematic review.

ACKNOWLEDGMENTS

For permission to study this material and for much patient help in answering queries concerning the sites, I am deeply indebted to Dr. Louis Dupree. Much assistance in preparing and studying the material was provided by Mrs. Lynda Hanke, Miss Jeanne Sinderman, Miss Victoria Leuba, and Miss Daryl Jackson. Compilation of the records and statistical calculations were done by Miss Sinderman and Mrs. Sandra Rendleman. Final checking of literature citations and manuscript was handled by Mrs. Hanke and Mrs. Rendleman.

SYSTEMATIC REVIEW

All the material available is listed by cave, the cut within each cave, level, and depth, then followed in parenthesis by number of separate individuals and Field Museum of Natural History (hereafter FMNH) catalog number. Each fragment identifiable as coming from a separate shell was counted as an individual. All juvenile specimens were tallied. Measurements were made only on adult examples, so that the number of specimens cited in figures 136 and 137 is significantly lower than the numbers listed under the species records. The non-quantified sampling procedures noted

AQ KUPRUK I

	Cut and Depth	FMNH number	Number of specimens	Mean height and S.E.M.	RANGE OF HEIGHT (16 17 18 19 20 21 22 23 24)
LOESS CHALCOLITHIC ?	5m : 250 cm.	156598	18	20.20±0.310	
	5n : 250 cm.	156590	34	20.92±0.250	
	5o : 250 cm.	156531	20	19.21±0.280	
	5o : 250 cm.	156602	13	20.52±0.559	
TRANSITIONAL CERAMIC NEOLITHIC	6p : 300 cm.	156589	32	20.43±0.311	
	6q : 300 cm.	156577	17	19.56±0.350	
	5p : 250 cm.	156594	7	20.35±0.508	
	4k : 350 cm.	156580	9	20.09±0.389	
	4l : 400 cm.	156599	5	17.79±0.686	
LOOSE GRAVELS NON-CERAMIC NEOLITHIC B	5m : 300 cm.	156587	28	19.17±0.268	
	5n : 300 cm.	156588	23	20.26±0.316	
	5o : 300 cm.	156600	43	20.44±0.209	
	1b :1015 cm.	156513	9	19.82±0.425	
COMPACT GRAVELS NON-CERAMIC NEOLITHIC A	4j : 480 cm.	156593	20	19.83±0.254	
	4k : 480 cm.	156572	5	18.46±0.436	
	4l : 480 cm.	156586	36	18.38±0.224	
	4j : 525 cm.	156584	6	19.81±0.712	
GRAVELY SANDS KUPRUKIAN B	4k : 600 cm.	156569	8	18.26±0.466	
	4j/3h: 700 cm.	156581	12	18.07±0.262	
	3h : 600 cm.	156574	5	19.76±0.730	

FIG. 136. Height variation in *Subzebrinus eremitus* from Aq Kupruk I. Solem.

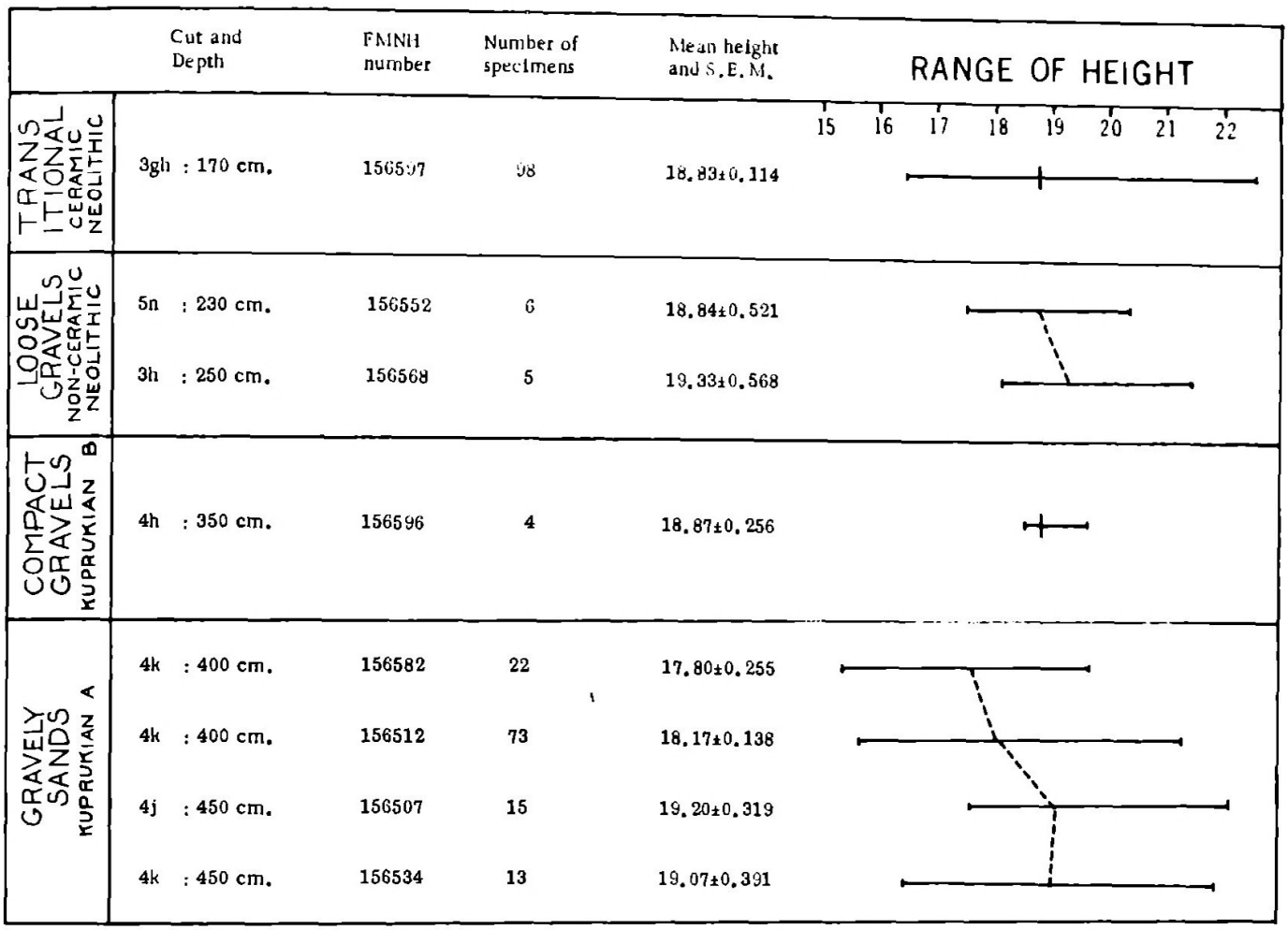

FIG. 137. Height variation in *Subzebrinus eremitus* from Aq Kupruk II. Solem.

above make any attempt to estimate age classes or percentage of adults useless. Data on systematic affinities and morphological variation will be presented elsewhere. This report considers only the stratigraphic records, time correlated variations and ecological significance of the species.

Ordinal and family level positions of the taxa are presented since these groups show marked differences in adaptability to moisture variations. The discussion of ecological factors requires that this information be available.

ORDER ORTHURETHRA

FAMILY Pupillidae

SUBFAMILY Pupillinae

Pupilla (Gibbulinopsis) sp.

Records:

A.K. I: 5o: 250 cm. (3 specimens, FMNH 156412)
A.K. I: 5o: 300 cm. (1 specimen, FMNH 156426)
A.K. I: 5p: 250 cm. (2 specimens, FMNH 156435)
A.K. I: 5p: 250 cm. (3 specimens, FMNH 156417)
A.K. I: 5p: 250 cm. (8 specimens, FMNH 156498)
A.K. II: 4k: 400 cm. (1 specimen, FMNH 156764)

Remarks: The only species reported from the general area that is adequately figured and described for comparison is *Pupilla annandalei* Pilsbry, 1921, which probably was collected in Nepal. It is larger, has an angular lamella, the parietal wall has a continuous peristome, and the palatal fold is much larger.

Reports on the ecology of Transcaucasian *Pupilla* cite the species as inhabiting steppe, semidesert, and dry pasture zones where they are found in dry plant remains and under stones or gravel (Likharev and Rammelmier, 1962, pp. 161–164). The recording of specimens from both the gravely sands of Horse Cave (pre 17,000 B.P.) and the transitional strata of Snake Cave (about 1,650 B.P.) emphasize the fragmentary data available.

FAMILY ENIDAE

SUBFAMILY ENINAE

Subzebrinus eremitus (Benson, 1849)

Bulimus eremita Benson, 1849, in Reeve, *Conch. Icon.* 5, *Bulimus*, pl. 78, figs. 573–"march . . . from the Bolun (= Bolan) Pass to Cabul (= Kabul), Afghanistan."

Ena eremita ("Reeve"), Gude, 1914, Fauna of British India, *Mollusca* **2**: pp. 247–248.

Zebrina (*Subzebrinus*) *eremita* (Reeve). Jaeckel, 1956, *Mitt. Zool. Mus. Berlin* **32**, 2: p. 342—Kandahar, Bolan Pass, Herat, Afghanistan.

Records:

A.K. I: 6p: 300 cm. (50 specimens, FMNH 156589)
A.K. I: 6q: 300 cm. (29 specimens, FMNH 156577)
A.K. I: 5m: 250 cm. (33 specimens, FMNH 156538)
A.K. I: 5n: 250 cm. (50 specimens, FMNH 156590)
A.K. I: 5o: 250 cm. (45 specimens, FMNH 156531)
A.K. I: 5o: 250 cm. (13 specimens, FMNH 156602)
A.K. I: 5o: 250 cm. (14 specimens, FMNH 156592)
A.K. I: 5p: 250 cm. (24 specimens, FMNH 156594)
A.K. I: 5m: 300 cm. (45 specimens, FMNH 156587)
A.K. I: 5n: 300 cm. (25 specimens, FMNH 156588)
A.K. I: 5o: 300+ cm. (46 specimens, FMNH 156600)
A.K. I: 210–330 cm. (Loess) (2 specimens, FMNH 156544)
A.K. I: 4l: Upper Loess (1 specimen, FMNH 156558)
A.K. I: East Face (4 specimens, FMNH 156536)
A.K. I: 4k: 350 cm. (9 specimens, FMNH 156580)
A.K. I: 4l: 350 cm. (2 specimens, FMNH 156556)
A.K. I: 4l: 400 cm. (8 specimens, FMNH 156599)
A.K. I: 4j: 430 cm. (2 specimens, FMNH 156583)
A.K. I: 4k: 430 cm. (1 specimen, FMNH 156545)
A.K. I: 4l: 430 cm. (4 specimens, FMNH 156591)
A.K. I: 4j: 480 cm. (21 specimens, FMNH 156593)
A.K. I: 4k: 480 cm. (5 specimens, FMNH 156572)
A.K. I: 4l: 480 cm. (48 specimens, FMNH 156586)
A.K. I: 4j: 525 cm. (9 specimens, FMNH 156584)
A.K. I: 4j: 600+ cm. (5 specimens, FMNH 156573)
A.K. I: 4k: 600 cm. (8 specimens, FMNH 156569)
A.K. I: 4j/h 700 cm. (15 specimens, FMNH 156581)
A.K. I: 3i: 400 cm. (1 specimen, FMNH 156508)
A.K. I: 3i: 480 cm. (6 specimens, FMNH 156547)
A.K. I: 3i: 525 cm. (1 specimen, FMNH 156554)
A.K. I: 3h: 600+ cm. (7 specimens, FMNH 156574)
A.K. I: gravels Ib: 1015 (13 specimens, FMNH 156513)
A.K. II: 6p: 125 cm. (5 specimens, FMNH 156537)
A.K. II: 6q: 125 cm. (1 specimen, FMNH 156551)
A.K. II: 6p: 320 cm. (2 specimens, FMNH 156562)
A.K. II: 5mn: 100 cm. (2 specimens, FMNH 156549)
A.K. II: 135 cm. (1 specimen, FMNH 156539)
A.K. II: 5m: 150 cm. (3 specimens, FMNH 156561)
A.K. II: 5n: 150 cm. (2 specimens, FMNH 156585)
A.K. II: 5m: 170 cm. (1 specimen, FMNH 156576)
A.K. II: 5no: 170 cm. (1 specimen, FMNH 156555)
A.K. II: 5mn: 200 cm. (7 specimens, FMNH 156546)
A.K. II: 5m: 230 cm. (3 specimens, FMNH 156575)
A.K. II: 5n: 230 cm. (8 specimens, FMNH 156552)
A.K. II: 5o: 230 cm. (2 specimens, FMNH 156564)
A.K. II: 5n: 260 cm. (4 specimens, FMNH 156565)
A.K. II: 5o: 260 cm. (1 specimen, FMNH 156559)
A.K. II: 5mn: 300 cm. (4 specimens, FMNH 156509)
A.K. II: 5n: 300 cm. (5 specimens, FMNH 156535)
A.K. II: 5m: 340 cm. (5 specimens, FMNH 156553)
A.K. II: 5n: 340 cm. (4 specimens, FMNH 156579)
A.K. II: 5o: 340 cm. (2 specimens, FMNH 156566)
A.K. II: 4l: 170 cm. (4 specimens, FMNH 156570)
A.K. II: 4l: 170 cm. (2 specimens, FMNH 156548)
A.K. II: 4h: 350 cm. (5 specimens, FMNH 156596)
A.K. II: 4j: 400 cm. (7 specimens, FMNH 156563)
A.K. II: 4k: 400 cm. (94 specimens, FMNH 156512)
A.K. II: 4k:400 cm. (24 specimens, FMNH 156582)
A.K. II: 4k: 400 cm. (24 specimens, FMNH 156582)
A.K. II: 4j:450 cm. (15 specimens, FMNH 156507)
A.K. II: 4k: 450 cm. (15 specimens, FMNH 156584)
A.K. II: 4j: 500 cm. (5 specimens, FMNH 156540)
A.K. II: 3h: 90–135 cm. (1 specimen, FMNH 156541)
A.K. II: 3gh: 170 cm. (97 specimens, FMNH 156597)
A.K. II: 3g: 250 cm. (3 specimens, FMNH 156543)
A.K. II: 3h: 250 cm. (6 specimens, FMNH 156568)
A.K. II: 3h: 300 cm. (34 specimens, FMNH 156590)
A.K. II: 3i: 300 cm. (2 specimens, FMNH 156560)
A.K. II: 3h: 350 cm. (2 specimens, FMNH 156510)
A.K. II: 3i: 350 cm. (3 specimens, FMNH 156567)
A.K. II: 3h: 400 cm. (1 specimen, FMNH 156571)
A.K. II: 3i: 400 cm. (5 specimens, FMNH 156550)
A.K. II: 3i: 450 cm. (2 specimens, FMNH 156557)
A.K. II: 2e: 80–135+ 41 cm. (2 specimens, FMNH 156533)
A.K. II: 2ef: 135 cm. (27 specimens, FMNH 156532)

Remarks: Probably a number of species are being confused under this name. Specimens from "Kashmir" (FMNH 123472) and "Ashabad, Transcaspia" (FMNH 48230) identified as *S. eremitus* can be exactly matched by the cave materials. A related species has been cited as inhabiting "the lower part of the meadow-plain belt bordering the arid plain . . . during the warm season . . . under stones and buries itself in the ground" (Likharev and Rammelmeier, 1962, p. 220).

Only *Trichia rufispira* was more common in Aq Kupruk I deposits. While the total range of variation in individual *Subzebrinus eremitus* populations remained relatively constant, there were noticeable and significant changes in mean size and the actual range at different levels. Unfortunately, there is no exact correlation between levels in different cuts, but the rough division into five zones has been followed. In several cases there were clearly successional sets with an adequate number of adults for statistically significant analysis. Thus in Aq Kupruk I loess, loose gravels, and compact gravels, there were three to four sets used, but in the transitional gravels to loess there were only two pairs from different cuts and in the gravelly sands only well isolated single samples. In Aq Kupruk II, there was an excellent series of four stages in the gravelly sands, but only isolated specimens or single samples in the other levels. Only fully adult specimens, readily identifiable by the thickened lip, were measured.

Data on these sets are summarized in figures 136 and 137. While diameter was measured and height/diameter ratios calculated in each case, the change in size is most dramatically shown in the height. Only this parameter has been charted. The other parameters show the same trends, but have a smaller range of variation. There is no unitary shift, but rather a series of oscillations reflecting more favorable and less favorable conditions for obtaining large adult size. Favorable conditions for orthurethran land snails in particular can be considered equivalent to moisture pattern. This, for the snail, is a combination of the total moisture available (rainfall and seepage) and percentage of the year during which the microclimate at ground level provides a high enough humidity for the snail to be active and feed. If total rainfall remained constant, but the length of the dry season

increased, then the snail could, in theory, become just as dwarfed through shortening of the activity period as if there was a decrease in total rainfall that lessened the total activity period. Under these circumstances, since the exact ecology of *Subzebrinus eremitus* is unknown, no conclusion as to rainfall *amount* can be made from the variation between populations. Larger size indicates temporarily more favorable (wetter) conditions, and smaller size less favorable (drier) conditions. Until the ecology of living *Subzebrinus* has been studied, the probable pattern of the shift will remain unpredictable.

It is obvious that when the oldest deposits, the gravelly sands of more than 17,000 years before the present, were accumulating, there was a marked shift from favorable to unfavorable conditions that resulted in a more than 1.5 mm. decrease in mean shell height. By the time of the younger compact gravels, the initial size level had been regained. There was a subsequent change to relatively unfavorable conditions, then a return to favorable conditions, indicated by first a decrease, then an increase in shell height. The upper zones of loose gravels, transitional soils, and loess show minor fluctuations from moderately favorable to very favorable conditions, except for a single dwarfed population at the base of the transitional zone (A.K. I: 41: 400). This population had a mean height of 17.79 mm., which was smaller than any other sample. The Street collections of *Subzebrinus eremitus* from near Maimana, Fariab Province, were taken in a dry gully and on a northeast facing slope of 40°. This is open steppe with very xerophytic vegetation. The mean shell height was only 17.2 mm., a figure substantially below that of all the Aq Kupruk samples. While none of the Maimana shells were alive, many were quite fresh and may have been dead for only a few months at most. This is an area of less than 200 mm. precipitation per year and has a much higher evaporation potential (Hassinger, 1968, p. 19).

Presumably the Aq Kupruk region was significantly wetter than the Maimana area during the period of accumulation, but no estimate concerning degree of wetness is possible.

Order **SIGMURETHRA**

Suborder **AULACOPODA**

Superfamily **LIMACACEA**

Family **VITRINIDAE**

Phenacolimax (*Oligolimax*) *conoidea* (Martens, 1874)

Vitrina conoidea (Martens, 1874), Sliznayaki (Mollusca), in: *Fedtschenko's Puteschestvie V Turkestan*, **2**, part 1, no 1: p. 8, pl. 1, fig. 5—Saraſschan.

?Helicolimax annularis (Studer), S. Jaeckel, 1956, *Mitt. Zool. Mus. Berlin* **32**, 2: p. 346—Walang, Salang-Tal, Hindu Kush and Ghorband-Tal, Afghanistan.

Helicolimax (*Oligolimax*) *annularis* var. *conoidea* (Martens), Likharev and Rammelmeier, 1962, *Keys to the Fauna of the U.S.S.R.* (English translation) **43**: pp. 338–339.

Record:

A.K. I: 5o: 250 cm. (1 specimen, FMNH 157175).

Remarks: The presence of only a single example reflects both the small size and fragile nature of this shell. Empty shells of Vitrinidae are collected infrequently even in areas where the live animals are abundant. Their fragile nature makes preservation quite unlikely.

Likharev and Rammelmeier (*loc. cit.*) report this species as living "in mountains under stones and in grass."

Relationships of this species are uncertain. Specimens from Europe identified as *Phenacolimax annularis* (Studer) (FMNH 10987, FMNH 103423-4) are much lower-spired and without the strong sculpture found on the Snake Cave specimen. The latter agrees exactly in apical sculpture and shape with specimens from Samarkand (FMNH 44512, FMNH 125535) identified as *P. conoidea*. Without dissection, the problem of affinities cannot be settled. I prefer to use the more local name *conoidea*.

Family **PARMACELLIDAE**

Parmacella (*Kandaharia*) *rutellum* (Hutton, 1849)

Parmacellus rutellum Hutton, 1849, *Jour. Asiatic Soc. Bengal* **18**: pp. 649–650—Kandahar, Afghanistan.

Vitrina baccata Hutton, 1849, *Jour. Asiatic Soc. Bengal* **18**: p. 650—Melmandeh, between Kojuck Pass and Kandahar, Afghanistan; Godwin-Austen, 1914, *Land and Freshwater Mollusca of India* **2**, 12: pp. 316–317.

Girasia rutellum (Hutton), Godwin-Austen, 1888, *Land and Freshwater Mollusca of India* **1**, 6: pp. 216–217.

Parmacella (*Kandaharia*) *kojhakensis* Godwin-Austen, 1914, *Land and Freshwater Mollusca of India* **2**, 12: pp. 314–316, pl. CXLII, figs. 1–8—west side Kojhak Pass, Afghanistan.

Records:

A.K. I: 5n: 250 cm. (1 specimen, FMNH 156501)
A.K. I: 5o: 250 cm. (1 specimen, FMNH 156411)
A.K. I: 5o: 250 cm. (3 specimens, FMNH 156502)
A.K. I: 5p: 250 cm. (1 specimen, FMNH 156500)
A.K. II: 4l: 170 cm. (3 specimens, FMNH 156503)

Remarks: Fragmentary to relatively whole specimens of this shell were found only within the upper loess and transitional strata. The typical embryonic whorl and subsequent irregularly platelike growth are restricted to this family. The cave specimens compare exactly with living material taken by the Street Expedition.

Early records for this species indicate existence in a

rather dry habitat. According to Godwin-Austen (*loc. cit.*) it has been found " . . . in the bed of a dry pebbly nullah at an elevation of 6000 feet" and "under stones along the bank of a dry nullah or river-bed." Material taken by the Street Expedition near Paghman at 2,440 meters was found in irrigated fields and thus yields no data on habitat under undisturbed conditions.

FAMILY **HELICARIONIDAE**

SUBFAMILY **ARIOPHANTINAE**

Tribe **MACROCHLAMYDI**

Parvatella flemingi (Pfeiffer, 1857)

Vitrina flemingi Pfeiffer, 1857, *Proc. Zool. Soc. London*, **1856**: p. 324. Scinde (error, corrected to 10,000 feet above the sea on the Murri (= Murree Hills, North Punjab). Pfeiffer, 1858, *Novit. Conch.* 1: p. 99, pl. 28, figs. 1–3.

Parvatella flemingi (Pfeiffer), Blanford and Godwin-Austen, 1908, *Fauna British India, Mollusca* 1: p. 147, fig. 53.

Records:

A.K. II: 5o: 260 cm. (1 specimen, FMNH 156452)
A.K. II: 5m: 340 cm. (1 specimen, FMNH 156455)
A.K. II: 4j: 450 cm. (4 specimens, FMNH 156454)
A.K. II: 4j: 500 cm. (1 specimen, FMNH 156505)
A.K. II: 3h: 350 cm. (1 specimen, FMNH 156451)
A.H. II: 3h: 400 cm. (2 specimens, FMNH 156453)
A.K. II: 3h: 500 cm. (1 specimen, FMNH 156504)
A.K. II: 3i: 400 cm. (3 specimens, FMNH 156456)
A.K. II: 3i: 450 cm. (5 specimens, FMNH 156506)

Remarks: Specimens from Gharihal, Murree, Punjab (FMNH 43349) compare exactly with the Horse Cave material in respect to microsculpture, whorl configuration and shape. The shells of *Euaustenia* differ from those of *Parvatella* only by having densely packed microspiral grooves over the upper shell surface.

The Horse Cave material differs from *Parvatella ghorbandensis* Jaeckel, 1956 by its much larger size.

Specimens were found only in the older strata of Horse Cave. In general, *Parvatella* inhabits wetter areas than *Parmacella*. Thus there may be an actual shift in moisture level indicated by the disappearance of *Parvatella* and appearance of *Parmacella*.

Genus *Syama* Godwin-Austen 1908

Fauna British India, Mollusca, 1: pp. 152–153

This segregate from the widely distributed genus *Macrochlamys* has been recorded from scattered localities in the Western Himalayas. This is the first record for Afghanistan. Previously described species include *S. splendens* (Hutton, 1838) from Mussoorie, Simla, and Uri in the Jhelum Valley; *S. prona* (Nevill, 1878) from Gahrwal, Naini Tal, and Simla; *S. promiscua* Blanford and Godwin-Austen, 1908 from Tundiani near Murree; *S. masuriensis* (Godwin-Austen, 1883) from Mussoorie; *S. theobaldi* Blanford & Godwin-Austen, 1908 from Murree and Tinali; probably *S. annandalei* Godwin-Austen, 1908 from Bijnore; and almost certainly *S. hyalinoidea* (Godwin-Austen, 1910) from Tundiani near Abbotabad at 8,500 feet elevation. Information is summarized in Blanford and Godwin-Austen (1908, pp. 152–157) and Godwin-Austen (1889–1914, p. 272).

The few altitude records are 7,000–10,600 feet elevation, but there are no ecological data recorded specifically for *Syama* species. *Macrochlamys*, from which *Syama* is a certain derivative, is an arboreal to semi-arboreal inhabitant of wetter forest areas. The recorded localities indicate that *Syama* is a drier zone adaptation.

None of the above are close enough in size and shape to the specimens from Horse and Snake Caves to be considered conspecific. Since this is not the appropriate place for descriptions of new zoological taxa, the specimens are called *Syama* sp., pending further study.

Syama sp.

Records:

A.K. I: 6p: 300 cm. (18 specimens, FMNH 156528)
A.K. I: 6q: 300 cm. (5 specimens, FMNH 156496)
A.K. I: 5m: 250 cm. (2 specimens, FMNH 156431)
A.K. I: 5m: 250 cm. (17 specimens, FMNH 156485)
A.K. I: 5o: 250 cm. (46 specimens, FMNH 156482)
A.K. I: 5o: 250 cm. (25 specimens, FMNH 156493)
A.K. I: 5o: 250 cm. (11 specimens, FMNH 156414)
A.K. I: 5o: 250 cm. (28 specimens, FMNH 156480)
A.K. I: 5p: 250 cm. (1 specimen, FMNH 157181)
A.K. I: 5p: 250 cm. (78 specimens, FMNH 156525)
A.K. I: 5p: 250 cm. (2 specimens, FMNH 156416)
A.K. I: 5n: 300 cm. (22 specimens, FMNH 156527)
A.K. I: 5o: 300 cm. (1 specimen, FMNH 156428)
A.K. I: 5o: 350+ cm. (10 specimens, FMNH 156483)
A.K. I: 5m: 300+ cm. (20 specimens, FMNH 156526)
A.K. I: 4l: 210–330 cm. (3 specimens, FMNH 156494)
A.K. I: 4l: 400 cm. (1 specimen, FMNH 156489)
A.K. I: 4k: 430 cm. (1 specimen, FMNH 156488)
A.K. I: 4l: 430 cm. (66 specimens, FMNH 156524)
A.K. I: 4l: 430 cm. (24 specimens, FMNH 156484)
A.K. I: 4l: 480 cm. (15 specimens, FMNH 156523)
A.K. II: 5m: 50 cm. (1 specimen, FMNH 156490)
A.K. II: 5m: 135 cm. (1 specimen, FMNH 156462)
A.K. II: 5n: 150 cm. (6 specimens, FMNH 156481)
A.K. II: 5no: 170 cm. (25 specimens, FMNH 156491)
A.K. II: 4l: 170 cm. (18 specimens, FMNH 156495)
A.K. II: 4l: 170 cm. (9 specimens, FMNH 156492)

Remarks: The appearance of *Syama* in the loose gravels of Aq Kupruk II is just above the disappearance of *Parmacella* and tends to add confirmation of a shift to drier conditions. The slightly earlier appearance of *Syama* in the compacted gravels of Aq Kupruk I may be a position effect of microclimate.

SUBORDER **HOLOPODA**

SUPERFAMILY **ACHATINACEA**

FAMILY **FERRUSSACIIDAE**

Caecilioides bensoni Gude, 1914

Caecilioides bensoni Gude, 1914, Fauna British India, *Mollusca* **2**: pp. 375–376, fig. 121—Plains of India.

Records:

A.K. I: 6p: 300 cm. (12 specimens, FMNH 156514)
A.K. I: 6q: 300 cm (1 specimen, FMNH 157128)
A.K. I: 5m: 250 cm. (2 specimens, FMNH 156529)
A.K. I: 5m: 250 cm. (1 specimen, FMNH 157177)
A.K. I: 5m: 250 cm. (3 specimens, FMNH 156430)
A.K. I: 5m: 300 cm. (2 specimens, FMNH 157179)
A.K. I: 5m: 300 cm. (12 specimens, FMNH 156516)
A.K. I: 5p: 250 cm. (30 specimens, FMNH 156521)
A.K. I: 5n: 300 cm. (12 specimens, FMNH 156515)
A.K. I: 5o: 250 cm. (1 specimen, FMNH 156429)
A.K. I: 5o: 250 cm. (6 specimens, FMNH 156520)
A.K. I: 5o: 250 cm. (15 specimens, FMNH 156519)
A.K. I: 5o: 250 cm. (1 specimen, FMNH 157176)
A.K. I: 5o: 250 cm. (2 specimens, FMNH 156413)
A.K. I: 5o: 250 cm. (2 specimens, FMNH 156530)
A.K. I: 5o: 300 cm. (1 specimen, FMNH 156427)
A.K. I: 5p: 250 cm. (5 specimens, FMNH 156418)
A.K. I: 4k: 350 cm. (2 specimens, FMNH 156518)
A.K. I: 4l: 430 cm. (15 specimens, FMNH 156522)
A.K. I: 4l: 480 cm. (55 specimens, FMNH 156517)

Remarks: Except for one single specimen of *Pupilla* from the gravelly sands of Aq Kupruk II, no specimens in this size range were recovered from that cave. Since *Caecilioides* did not appear until the loose gravels of Aq Kupruk I, the lack of records from Aq Kupruk II probably reflects only sample bias against small species.

There are no data on the ecological occurrence of this species, but the related *C. acicula* (Müller) "lives in the ground among the roots of grasses, and reaches a depth of 40 cm; those living near the surface are encountered under flat stones" (Likharev and Rammelmeier, 1962, p. 286). There are records of *Caecilioides* inhabiting caves.

FAMILY **SUBULINIDAE**

SUBFAMILY **RUMININAE**

Zootecus insularis chion (Pfeiffer, 1857)

Bulimus chion Pfeiffer, 1857, *Proc. Zool. Soc. London* **1856**: p. 332—mouth of Indus River and in the Punjab; Hanley and Theobald, 1876, *Conch. Indica*, pl. 22, fig. 1.

Zootecus insularis form *chion* (Pfeiffer), Pilsbry, 1906, *Man. Conch.*, (2), **18**, p. 112, pl. 26, fig. 32.

Zootecus chion (Pfeiffer), Gude, 1914, Fauna British India, *Mollusca* **2**: p. 373.

Record:

A.K. II: recent on surface (70 specimens, FMNH 156598)

Remarks: Whether this is a geographic race or distinct species is unknown. Considerable variability is shown over the Cape Verde Islands to Upper Burma range claimed for this species. Without dissection and study of comprehensive material, no accessment of its systematics is possible. The Aq Kupruk shells agree closely with material from Pasni, between Karachi and Gwardar, Pakistan (FMNH 53541). No material of this species was found in the excavations themselves.

SUPERFAMILY **HELICACEA**

FAMILY **HELICIDAE**

Trichia rufispira (Martens, 1874)

Helix rufispira Martens, 1874, Sliznyaki (Mollusca), in: *Fedtschenko's Puteshestvie V Turkestan* **2**, part 1, no. 1: p. 9, pl. 1, fig. 7, pl. 3, fig. 38—Sarafschan.

Cathaica rufispira rufispira (Martens), Yen, 1939, *Abhl. Senckenberg. Naturf. Gesell.* **444**: p. 142, pl. 14, fig. 60.

Cathaica rufispira hispida Jaeckel, 1956, *Mitt. Zool. Mus. Berlin* **32**, 2: p. 349, figs. 8a-d—Sarekanda Mts., 4,100 meters, Badakschan, Afghanistan.

Eulota (*Leucozonella*) *rufispsira* (Martens), Likharev and Rammelmeier, 1962, *Keys to the Fauna of the U.S.S.R.* (English translation) **43**: p. 456—Samarkand, Tashkent and Fergana regions of Uzbek SSR and Tadzhik SSR.

Records:

A.K. I: 6p: 300 cm. (825 specimens, FMNH 156420)
A.K. I: 6q: 300 cm. (168 specimens, FMNH 156442)
A.K. I: 5n: 200 cm. (18 specimens, FMNH 156460)
A.K. I: 5m: 250 cm. (299 specimens, FMNH 156422)
A.K. I: 5n: 250 cm. (545 specimens, FMNH 156432)
A.K. I: 5o: 250 cm. (529 specimens, FMNH 156424)
A.K. I: 5o: 250 cm. (529 specimens, FMNH 156419)
A.K. I: 5o: 250 cm. (188 specimens, FMNH 156441)
A.K. I: 5p: 250 cm. (505 specimens, FMNH 156434)
A.K. I: 5m: 300 cm. (557 specimens, FMNH 156421)
A.K. I: 5n: 300 cm. (267 specimens, FMNH 156443)
A.K. I: 5o: 300 cm. (493 specimens, FMNH 156425)
A.K. I: 4l: 210–330 cm. (14 specimens, FMNH 156476)
A.K. I: 4l: II Upper Loess (1 specimen, FMNH 156466)
A.K. I: 4l: III Upper Loess (11 specimens FMNH 156467)
A.K. I: 4: IV East Face (2 specimens, FMNH 156463)
A.K. I: 4k: 350 cm. (2 specimens, FMNH 156438)
A.K. I: 4l: 350 cm. (1 specimen, FMNH 156444)
A.K. I: 4l: 400 cm. (206 specimens, FMNH 156440)
A.K. I: 4j: 430 cm. (4 specimens, FMNH 156470)
A.K. I: 4k: 430 cm. (13 specimens, FMNH 156446)
A.K. I: 4l: 430 cm. (383 specimens, FMNH 156423)
A.K. I: 4j: 480 cm. (56 specimens, FMNH 156439)
A.K. I: 4k: 480 cm. (21 specimens, FMNH 156447)
A.K. I: 4l: 480 cm. (549 specimens, FMNH 156433)
A.K. I: 4j: 600 cm. (13 specimens, FMNH 156473)
A.K. I: 4k: 600 cm. (18 specimens, FMNH 156475)
A.K. I: 4j: 700 cm. (1 specimen, FMNH 156450)
A.K. I: 4j/3h: 700 cm. (35 specimens, FMNH 156479)

A.K. I: 3i: 400 cm. (7 specimens, FMNH 156445)
A.K. I: 3i: 480 cm. (20 specimens, FMNH 156478)
A.K. I: 3i: 525 cm. (4 specimens, FMNH 156449)
A.K. I: 3h: 600 cm. (20 specimens, FMNH 156471)
A.K. I: 3i: 600 cm. (10 specimens, FMNH 156474)
A.K. I: 1b: 1015 (Gravels 1) (85 specimens, FMNH 156409)
A.K. II: 5mn: 100 cm. (1 specimen, FMNH 156458)
A.K. II: 5n: 135 cm. (21 specimens, FMNH 156437)
A.K. II: 5m: 340 cm. (1 specimen, FMNH 156472)
A.K. II: 5n: 340 cm. (6 specimens, FMNH 156464)
A.K. II: 4k: 400 cm. (1 specimen, FMNH 157180)
A.K. II: 4j: 450 cm. (2 specimens, FMNH 156468)
A.K. II: 3gh: 170 cm. (1 specimen, FMNH 156448)
A.K. II: 3h: 300 cm. (1 specimen, FMNH 156459)
A.K. II: 3h: 350 cm. (11 specimens, FMNH 156457)
A.K. II: 3i: 350 cm. (6 specimens, FMNH 156465)
A.K. II: 3l: 400 cm. (13 specimens, FMNH 156477)
A.K. II: 3i: 450 cm. (7 specimens, FMNH 156461)
A.K. II: 2e: 80–135 cm. (1 specimen, FMNH 156469)

Remarks: Many varietal names have been applied to this species. Most of these were based on very few examples. A specimen of typical *Trichia rufispira* from Tschupan-ata, near Samarkand (FMNH 39776) can be exactly matched by the individuals from the Horse Cave and Snake Cave material. While many of the latter have a higher spire and narrower umbilicus, the differences are not large enough to warrant taxonomic recognition. *Trichia rufispira hispida* Jaeckel, 1956 is based on juvenile specimens that are rather low-spired and with a rather sharply angled periphery. Their shape characteristics can be matched by some of the Snake Cave juveniles. I am doubtful that this is a valid systematic unit.

No ecological data have been recorded concerning this species. Likharev and Rammelmeier (1962, pp. 455, 458) indicate that probably related species are found "in the river valleys of the desert-steppe zone" and "in the mountainous steppe on dry slopes overgrown with vegetation". In Afghanistan, dead material of this species was taken by the Street Expedition in both Fariab and Herat Provinces. Whether these are from extinct or living populations is unknown.

Specimens were collected at all levels in both caves. In the Snake Cave deposits it was the dominant species throughout the entire series, usually accounting for 90 per cent of the specimens when more than a dozen shells were obtained. In the Horse Cave deposits it was much more sparsely represented. Occasionally it showed 75–80 percent dominance over *Subzebrinus*, but at many levels *Subzebrinus* was common and *Trichia* absent.

Whether this differential abundance represents an ecological difference, an accident of preservation caused by wash-down factors, or a combination of the two is unknown. Without collecting at the areas surrounding the caves for living mollusks, no assessment of the causative factors will be possible.

Measurements on material from several sets failed to detect any significant size or shape variation between different levels of the caves.

SIGNIFICANCE OF RECORDS AND VARIATION

There have been neither collections of recent mollusks from the vicinity of Aq Kupruk, nor sufficiently concentrated collecting efforts in any area of Afghanistan to establish what are the current molluscan biocoenoses. When the fact that ecological requirements and zonation of the species themselves are not delineated is combined with the above lacunae, it is obvious that no detailed conclusions can be drawn from the molluscan data. We do not have sufficient information concerning the distribution and ecology of living Afghanistan and Kashmir species to interpret past conditions except in the most general way.

Chronological distribution of the Aq Kupruk mollusks is summarized in table 15. For reasons outlined above in the introduction, records for *Phenacolimax*, *Pupilla*, and *Caecilioides* almost certainly are incomplete and misleading. Only an accident of partial specimen cleaning permitted recovery of any specimens belonging to these taxa. The records of *Parmacella* may be limited for the same reason, although the sudden replacement of *Parvatella* by both *Syama* and *Parmacella* in the Aq Kupruk II loess gravels suggests a shift in ecological conditions. Whether this is a moisture shift, *per se*, or a combination of vegetation (protective and humidity conserving) and rainfall (total moisture) factors is uncertain. The change is definite, with the youngest *Parvatella* having been recovered from A. K. II: 5o: 260, near the lower portion, and the oldest *Syama* coming from A. K. II: 5no: 170, a significantly higher level. Only a single small sample of *Subzebrinus* (see fig. 137) is from this zone. While it is above the youngest *Parvatella*, it is below the oldest *Syama*. Its rather small size is not significantly different from populations taken in other cuts.

The total absence of freshwater mollusks from the deposits strongly suggests that these are "wash-down" assemblages. Shells are tumbled down the hillsides into the caves by a combination of rain and wind erosion. If these were "flood-water" assemblages, a higher proportion of the shells would have been broken and at least a few freshwater snail shells would have been present. While it is possible that the Balkh River has been without freshwater snails (no collections have been made in this area) throughout this period, I consider this to be highly unlikely. It is very probable that the shells in each cave represent thanatocoenoses derived from the particular slopes surrounding the caves and that transport from upstream colonies is not involved.

Positioning of the caves could greatly affect the microclimates during periods of climatic change. Aq Kupruk I (Snake Cave) faces north and would have a cooler and moister microclimate than Aq Kupruk II (Horse Cave) which faces south and would be both warmer and drier. The earlier appearance of

TABLE 15

STRATIGRAPHIC RECORDS OF MOLLUSKS FROM AQ KUPRUK

Aq Kupruk	*Trichia rufispira*		*Subzebrinus eremitus*		*Syama* sp.		*Parvatella flemingi*		*Parmacella rutellum*		*Pupilla* sp.		*Caecilioides bensoni*		*Phenacolimax comoidea*	
	I	II	I	II	I	II	I	II	I	II	I	II	I	II	I	II
Soil zone Gray loess (Chalcolithic?)	X	X	X	X	X	X			X				X			
Transitional, loess to gravels (Ceramic Neolithic)	X	X	X	X	X	X			X	X	X		X		X	
Loose gravels (Non-Ceramic Neolithic B)	X	X	X	X	X	X		X					X			
Compact gravels (Non-Ceramic Neolithic A)	X	X	X	X	X			X								
Gravely sands (Kuprukian B)	X	X	X	X				X				X				

Syama in Aq Kupruk I (see table 15) and restriction of *Parvatella* to Aq Kupruk II may be accidental or may reflect a temperature restriction rather than a straight moisture change. Possibly only an accident of colonization is involved. Comparatively few mollusks seem to be limited in an absolute sense by temperature, but this could be a limiting factor if moisture factors were stable. If moisture alone was controlling the appearance, I would have expected an earlier appearance of *Syama* in Aq Kupruk II and the presence of *Parvatella* in Aq Kupruk I. Without much more information concerning local conditions and ecology of the species, this apparent anomaly will remain unsolvable.

The difference in abundance of *Trichia rufispira* at the two caves may reflect accidents of "wash-down" or an unknown ecological difference that resulted in a much lower population level throughout the deposition period at Aq Kupruk II. The fact that *Trichia* showed no clear size and shape variation while *Subzebrinus* varied markedly probably is related more to phyletic position than to any ecological difference. *Trichia* belongs to an advanced helicoid group in the Sigmurethra where there is a secondary ureter with relatively efficient resorption of water and direct elimination of waste projects out the pneumostome. This does not involve use of the pallial water reservoir. *Subzebrinus* belongs to the Orthurethra, where there is no secondary ureter with water resorption possible. Waste products enter the mantle cavity and must be flushed out by partial use of the pallial water reservoir. While a pseudo-ureter is formed in some enids (see Solem, 1964: p. 115), the anatomy of *Subzebrinus eremitus* is unknown. I have no doubt that its excretory system is much less efficient in terms of water useage than is the excretory system of *Trichia*. Hence *Subzebrinus* would be much more sensitive to minor changes in water supply and thus reflect shifts in moisture pattern by size changes.

Several things would be necessary in order to give more detailed interpretations of the variational trends. First a study of ecology and distribution of the species within Afghanistan today is required. Probably a simple survey of the variation within *Subzebrinus* related to local vegetative cover and moisture patterns would enable firmer conclusions as to the meaning of recorded size changes. Secondly, a study of *Parvatella* ecological valence as contrasted with *Syama* and *Parmacella* habitats might pinpoint the habitat transition indicated by the disappearance of the former and arrival of the latter. Thirdly, adequate collections in the surrounding hills and slopes by a malacologist might clarify the differential abundance of *Trichia* in the two caves. Fourthly, collections in the Balkh River for freshwater mollusks might help confirm the possible "wash-down" versus "flood water" origin of the deposits.

At present, only two real conclusions can come from these data. First, the disappearance of *Parvatella* and entrance of *Syama* and *Parmacella* in the deposits tell of a shift from wetter to drier moisture patterns. Second, the fluctuations in size of adult *Subzebrinus* indicate minor shifts in moisture pattern between favorable (larger shells) and less favorable (smaller shells), but even the least favorable conditions did not reach the extreme conditions found near Maimana, Fariab Province today. At this place, *Subzebrinus* is greatly dwarfed in size.

AQ KUPRUK: ART AND SYMBOL

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The two small engraved or carved stone artifacts excavated at Aq Kupruk during the 1965–1966 season pose a unique series of problems for analysis and interpretation. These problems are intrinsic and comparative and are due to the deteriorated states of the pieces and the fact that they are the first and also the only known examples of intentionally carved or marked artifacts from the presumed Upper Palaeolithic or pre-Neolithic period of Afghanistan. When I wrote the first draft of this paper an estimated date of *ca.* 20,000 B.C. was considered possible for the two artifacts. I have just been informed that a date of *ca.* 8,000 B.C. may now be more accurate. It would therefore be both difficult and hazardous to attempt to place these pieces within the huge body of seemingly comparable prehistoric materials excavated in Middle Eastern and Eurasian areas to the west and north. Nevertheless, by use of recently developed analytic and comparative methodologies a considerable amount of useful data can be ascertained and tentative interpretations can be assayed.

One of the artifacts is an apparently humanoid head carved and engraved on a small, soft limestone pebble, $2\frac{1}{2}$ inches high and $1\frac{1}{4}$ inches wide. The pebble powders to the touch and it will continue to deteriorate with handling unless treated with a preservative. The other is a flat fragment of much harder stone, 6 cm. by 7 cm., that contains four series of engraved notches along two of its remarkably straight, right-angle edges. The engraved notches are more or less well preserved, but a more delicate linear marking on the faces of the stone is much deteriorated and the engraved patterns are difficult to reconstruct.

These two artifacts, apparently contemporaneous, represent entirely different classes of intentionally made or marked objects. The presence of these two classes suggests a complex symbolic usage, beyond what one might have deduced from the discovery of either artifact separately. The author has made a study of these two classes, carved and engraved representational "art" including human representations and non-representational sequences of marks, among the Upper Palaeolithic and Mesolithic mobiliary materials of Europe. I therefore note that both classes appear in Europe in rather early levels of the Upper Palaeolithic, both in typical Aurignacian levels in Western Europe and in the East Gravettian (Pavlovian) levels in Moravia. Both classes persist as separate contemporary cultural products throughout the Upper Palaeolithic and into the Mesolithic and Neolithic, a period spanning some 25,000 years. Sequences of marks engraved on non-utilitarian artifacts have also been excavated in the earliest post-Mousterian levels of Europe, the Châtelperronian (Arcy-sur-Cure).

One cannot therefore trace the derivation or establish the chronological position of these Aq Kupruk artifacts by typological comparison. There are comparable examples from Europe both earlier and later than the original presumed date of 20,000 B.C. for these artifacts and widely dispersed examples from Europe and the mid-East if the more recent 8,000 B.C. date is validated.

There is a century-old problem relating to these two classes of artifact. The carved head, for instance, can be subsumed under the general descriptive class of prehistoric "art" or under that of "anthropomorphic representation." The flat stone may be placed into that catch-all traditional category, "decorated pieces of undetermined usage." Such categories, however, neither explain nor define these prehistoric materials and at most they represent a form of heuristic typology from which significant or relevant interpretations concerning meaning or usage are absent.

It would be meaningless also to speculate that the head from Aq Kupruk represents "art, perhaps for religious, ritual or mythological usage" without a better understanding of the roles played by art in early prehistoric cultures. Was the head made for a one-time limited use or was it intended for long-term retention and repeated use? Since it will not stand, was it intended to be carried about? Was it made in a style that was part of a regional tradition? The single, deteriorated artifact can at first glance tell us little. Yet these questions were found to be crucial in the attempt to understand comparable Upper Palaeolithic pieces from Europe.

It would be possible to attempt an interpretation based on analogy to the uses and meanings of anthropomorphic images in later historic cultures. But this would tell us nothing factual about the Aq Kupruk head and would only indicate the range and capacity for comparable symbolic usage among *Homo sapiens* in general.

These difficulties are compounded for the flat stone with the edge notches since non-representational units or symbols are infinitely open-ended in possible meaning. At one time marks of this type found on Upper Palaeolithic bones and stones were called hunting tallies ("marques de chasse") but recent analyses by the

author have shown that this concept is untenable, at least for a majority of such sequences (Marshack 1969, 1970, 1971*a*, 1971*b*, 1972*a*, 1972*b*). Clearly we cannot explain prehistoric sequences of this class by reference to visually similar tally systems or decorative patterns among primitive historic peoples.

Methodologically, then, we are left with the need for a different type of analysis, the careful and exhaustive intrinsic analysis of each artifact and with interpretations that are based on these data.

THE HEAD

Examination of the humanoid head by binocular zoom microscope with a magnification range of 10× to 60× revealed that the deterioration of the surface and the granular composition of the stone made it difficult to determine all the individual engraving or carving strokes and therefore the general style of working. One could, however, determine the series of straight-line strokes that formed the circles of the eyes and also the fact that the nose and mouth were formed by a complex overengraving and deepening that suggested a form of true carving or sculpture. The combination of deterioration, granularity, and low reflectivity of the material made it impossible to establish by visual means all of the remaining, intentionally made three-dimensional planes.

By a technique of examination and documentation that turned the pebble in short arcs of 5 and 10 degrees and photographed the pebble at these different angles to the plane of the film and also in light at various angles to the artifact, it was possible to differentiate planes that were not apparent when the pebble was held in hand or was under the microscope (fig. 138*a*, *b*, *c*, *d*, *e*, *f*, *g*).

Piecing together these three-dimensional differentiations, it was possible to re-create a schematic rendition of the remnant intentionally carved or engraved planes. Figure 140 is an exaggerated rendition of the image so reconstructed.

The resulting form is substantially different from the object as it appears to the eye or as it appears in the documentation of any single photograph.

This reconstructed image reveals that, while the eyes were drawn as circles that left prominent eyeballs, the "nose" was formed by a series of strokes that evacuated the area, leaving a depression rather than a prominence. This "nose" begins with a wide angular cleft rather like that of the nose cavity in a skull and seems almost to be intentionally "unrealistic." The structuring of this odd nose is apparently not simply a matter of crudity in rendition since even a single engraved line would more realistically have indicated a nose. The mouth is also formed peculiarly. The lower lip is carved almost like a leg and foot turned under while the more deeply engraved line of the mouth itself apparently arcs upward in what seems to be a smile. The top of the head indicates the presence of a coiffure or a hat, including the remains of a double circle or whorl at the very top. What may be a tiny ovaloid ear appears below the coiffure at left.

It is obvious that one cannot call this remnant image the head of a man, a woman, or an anthropomorphic being or spirit. At most one can call the image humanoid and declare that the seeming coiffure might indicate femininity, but if the engraved lines represented a hat or even horns we might have something different. The lack of a nose might indicate an anthropomorphic or animistic being. It is clear that other examples from this area and this period will be required in order to determine the range of representational and artistic styles practiced in the Aq Kupruk culture, particularly in the making of anthropomorphic images.

Despite these difficulties the reconstruction does offer data that are adequate for broad cognitive interpretations.

This image is neither a crude nor a primitive effort. It does not represent an individual or a cultural "infantilism." Such first stage efforts would most likely have indicated the presence of eyes, nose, and mouth by a gouge or line. Here each element is complex and different in style and concept. There seems, in fact, to be a large content of traditional and cultural rendition in the image. The fact that an oval, flattened pebble was chosen and then engraved with a face along the narrow edge, placing the eyes, ear, mouth, hair, or hat around the three visually distinct planes of the pebble, also argues for a high degree of foreknowledge and learning. There are sculptural elements on each side and at the top and bottom that cannot be seen together at any single angle of holding the pebble. It must therefore have been conceived and worked in the round.

Not visible in the series of photographs of figure 138, for instance, is the fact that the image was also carved underneath. Below the face, as seen in frontal view, there is a deepening of the area under the lip (fig. 139). The effect is that of a modeling to heighten the strange "foot" appearance of the lower lip. A similar three-dimensional effort, creating an effect that is not fully seen in the frontal view, is involved in the whorl on the top of the head. The three-dimensional complexity of the face is perhaps best experienced by comparing the side view with its total absence of a nose (fig. 138*a*) with the frontal view in which the nose is carved as a negative element (fig. 138*e*).

That a pebble of a specific size and shape was perhaps sought and chosen for the relatively difficult imposition of these diverse cognitive, perceptual, and kinesthetic elements hints that the carving and engraving were performed within a set of well-known cultural sequences and concepts.

FIG. 138*a–g*. Pebble from Aq Kupruk II photographed at various angles and in varied lighting to show the carved and engraved planes. Photo: Marshack.
FIG. 139. View of Aq Kupruk II pebble as seen from below left, indicating the gouging below the lip. Photo: Marshack.

If this deduction of an evolved tradition is correct it may be helpful to compare it with examples from the earlier Upper Palaeolithic cultures of Europe. We can do this in terms of the cognitive elements involved without knowing the specific meanings or uses of the images.

The mammoth hunters of the East Gravettian (Pavlovian) culture of Moravia, Czechosolvakia, *ca.* 27,000 B.C., left carved or engraved faces in a bewildering variety of styles, forms, and degrees of competence. A half-round chunk of mammoth thigh bone from Predmost, 6½ inches in diameter, has a crudely gouged out humanoid face on the slightly curved flat side of the bone. Eyes and nose are mere pits and the mouth is formed of two joined arcs that create a slight upward smile. The engraving is entirely front face and was clearly quickly made. An example from Dolní Věstonice is a small chunk of ivory that looks like a flat piece of wooden board which was roughly shaped into ovaloid form. It has a face gouged out crudely on the flat front surface; four gashes form the eyes, nose, and mouth. These examples might easily have been interpreted as man's first efforts at human representation as, in fact, Karel

Absolon did term the round face on the thigh bone in 1925.

Later excavations, however, revealed that the same general culture carved and sculpted faces of exquisite sophistication. Before describing these it should be noted that a study of the two pieces above that went beyond the obvious crudity of the faces revealed the presence of certain cognitive contents that may be as important as the faces themselves. The mammoth thigh bone is almost half-moon in shape, with a flattened bottom perhaps intended for the image to stand on a ledge, a rock, or the ground. In such a case the stationary face may have been intended to serve as part of a complex symbolic relation that proceeded around it. The ivory face has crude hair engraved on the top narrow edges, unseen when viewed front face. This indication of a three dimensional rendering to what at first seems a flat image may hint that the piece was intended to be held and used in hand. There is no certainty in these conjectures, but the questions are raised because microscopic evidence from the Upper Palaeolithic does reveal that the visual, apparent crudity of engraved or sculpted images often masks a symbolic complexity and a diversity of uses. In this respect we can perhaps assume that the Aq Kupruk head was not intended to stand on its edge but was rather intended to be held in hand, perhaps for use in a ceremony, or was meant to be carried in pocket or pouch. The deterioration of the soft stone makes any analysis of hand wear or polishing impossible.

Returning to the East Gravettian, a well-known tiny head, some two inches high, carved from mammoth ivory, contains three-dimensional realistic eyes, a carved nose and lips and a subtle modeling of the cheeks, the brow and the eye cavities within which each eye sits. This female head has a carved coiffure similar to that on the Aq Kupruk head, with a rounded whorl or knot on top. The head is carved along the narrow edge of a flattened ovaloid form, again as on the Aq Kupruk pebble. We thus have East Gravettian examples of crudity and realism. This culture also created other faces of extraordinary abstraction, recognizable as female or human only because the bodies are extant. One face on a figurine from Dolní Věstonice consists of two eye slits cut at an angle into the wet clay, the long line of the nose having been made simply by drawing a straw or twig lightly on the clay. The face lacks a mouth. If this head were found as a fragment it would certainly be considered "crude," but as part of the formal, almost realistic female figure it is seen as a conscious effort at abstraction, schematization and simplification. Another face, from Predmost, engraved on a mammoth tusk, consists of a triangle, the chin forming the bottom angle, with a ladder hatching to indicate the general areas of the eyes, nose and mouth. It is a completely geometricized concept. These, then, represent a few

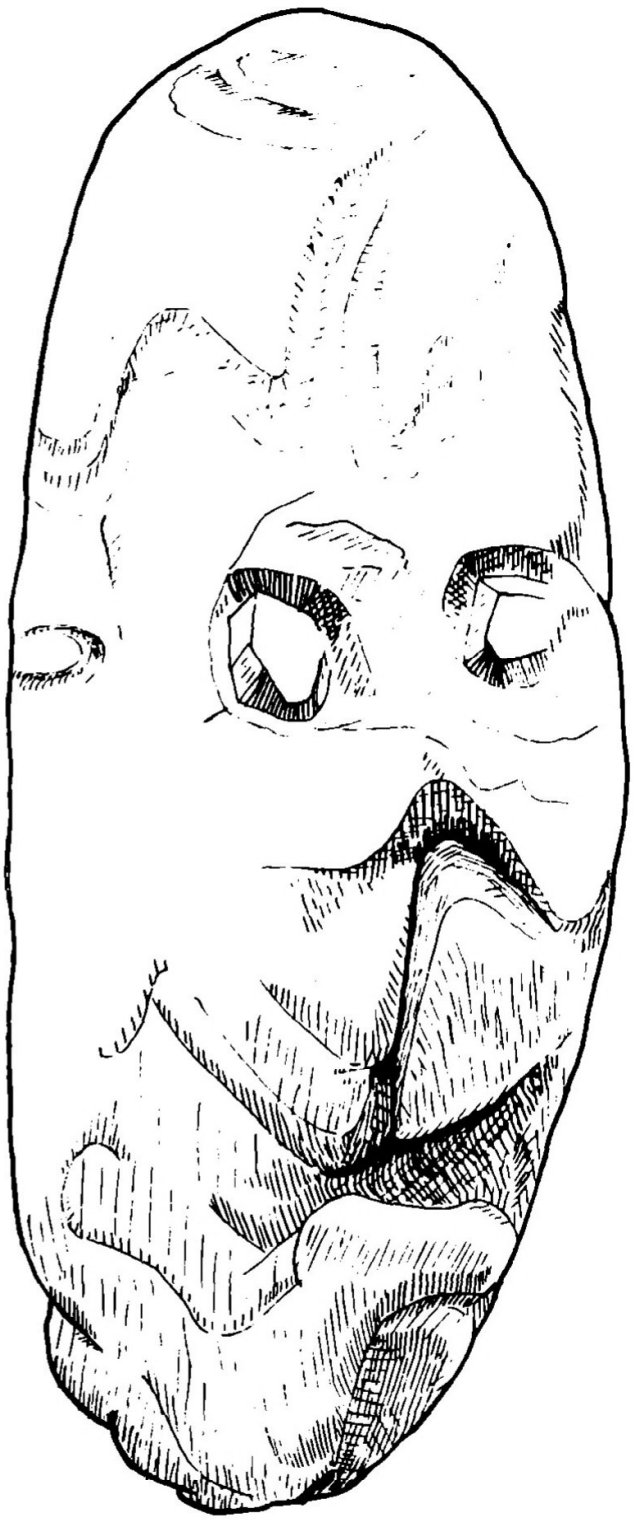

FIG. 140. Engraved pebble from Aq Kupruk II. Exaggerated schematic rendition in line. Marshack.

of the types and forms of the humanoid face supplied by one culture and period of the Upper Palaeolithic.

The point should be clear. A certain level of sophistication in representation can indicate the presence of an evolved tradition, but an example of seeming or comparative crudity cannot indicate either its presence or absence. The East Gravettian heads

range from the crude and quickly made, to the carefully carved realistic, to those either intentionally abstracted or with an intentionally destroyed realism. A comparable complexity and variety is found among the carved, engraved, and painted humanoid images of the Franco-Cantabrian cultures of the Upper Palaeolithic.

The Aq Kupruk head would seem to contain cognitive and cultural elements both of realism and of intentional and perhaps traditional non-realism.

I therefore hesitate to deduce from the single example of the Aq Kupruk head that it represents a man, a woman, a god or goddess, or an anthropomorphic being, or that the quality of the carving represents the level of sophistication in image making for that culture. What is apparent, however, is that the sculptural elements of the one piece do place it relatively late in the evolution of, or from, Upper Palaeolithic art. It may be that this level of sophistication in an area far from the generating centers of Upper Palaeolithic representation properly places the piece later than the first suggested date of *ca.* 20,000 B.C. and closer to the post-Würm *ca.* 8,000 B.C. The area and the culture are still too little known and the one example is inadequate for certainty.

THE FLAT STONE

The small flat stone with the edge notches poses an even more intriguing series of problems (fig. 141*a*, *b*, *c*, *d*).

I presume that art and representation imply the presence of a corollary mythology or narration. Such images would have a name, be storied, and their making would be traditional, maintained by repetitive cultural sequences. But what is one to make of sets of non-representational marks engraved on a non-utilitarian artifact?

One face and one edge of the stone show series of long engraving marks that may be part of those that

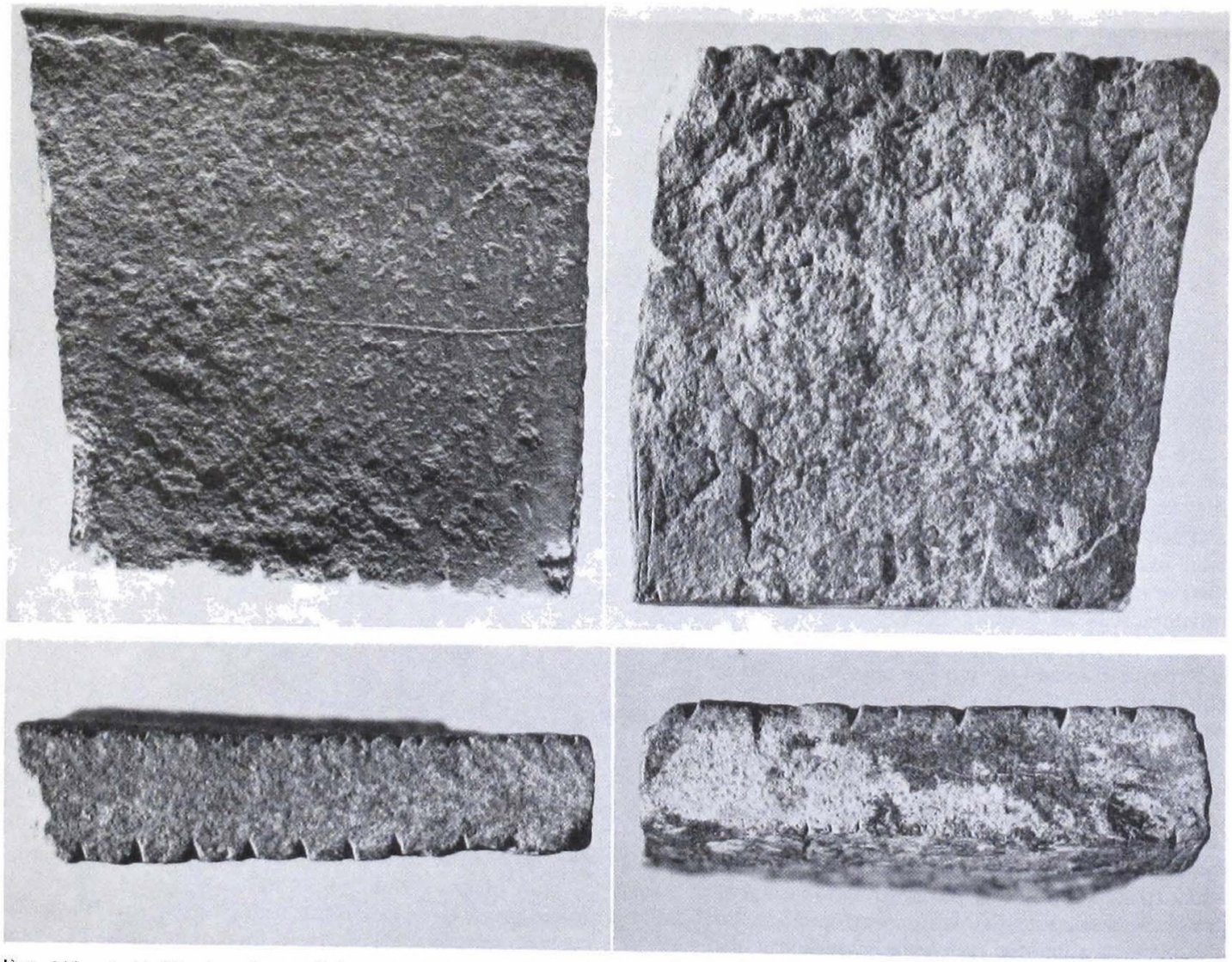

FIG. 141. (*a*,*b*) The two faces of the engraved and notched flat stone from Aq Kupruk III. (*c*,*d*) The two edges of the stone showing the flat edges at 90° to the surfaces and the four variable sequences of edge notches. Photo: Marshack.

FIG. 142. *Detail of the lower left corner of face number two showing a series of marks that indicate a cutting of the stone preparatory to an intentional breaking. Photo: Marshack.*

created the cutting line or groove along which the stone was intentionally broken in order to make a hand-sized slate which was then used for the notching (fig. 142). The intentional breaking and shaping of stone and bone slates intended for the engraving of sets have been documented by the author for the Upper Palaeolithic.

Microscopic examination of the Aq Kupruk edge marks reveals that they show no evidence of persistent wear or rounding along their tops as would occur if the stone were used for any length of time as a tool with the notches intended for gripping (fig. 143).

The microscope also reveals that the marks were made in an odd variety of rhythms and spacings. Along the top of figure 141*c* the notches are small and closely spaced while along the lower edge the notches are deeper and more widely spaced. The microscope

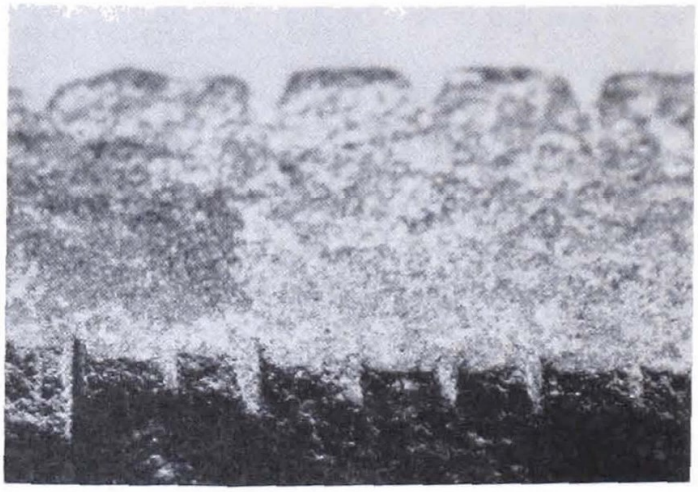

FIG. 143. Detail. Section of small marks along the upper edge of fig. 141*c* showing differences in the cross-sections and depths of the notches. Photo: Marshack.

FIG. 144. Microphotographic detail of three wide, faint marks along the top edge of fig. 141*c*. Photo: Marshack.

also reveals that the notches were made by different points or types of stroke, some of the small marks being made by a wide, flattened point (fig. 144) but others by a narrower sharper point (see the mark at left, fig. 143). In contrast the deeper notches seem to have been made by a repeated stroking that formed a generalized, rounded groove (fig. 145). This variation of stroke is even more apparent in figure 141*d*. Along the top edge is a series of regularly spaced deep notches which are interspersed with a number of faintly engraved single strokes in an almost random fashion, as though to indicate a later, secondary marking. The lower edge has numerous small notches made in varying sizes and depths. A number of these are badly deteriorated.

There is perhaps an indication in this variety of a conceptual or a temporal differential in the engraving of the sets along the four edges. The engraving tool seems to have been changed for various sets, while the rhythm, spacing, and pressure were certainly changed. It is possible therefore that the stone was not marked at a single moment but that the markings were cumulative and that the visual differences are due to a separation in the time of engraving. If this is so, we have a problem for interpretation. Since the stone is apparently not an art object, that is, a representational or symbolic image, or a decorated costume piece, nor a working tool or a platform for work, we are left with the possible meanings in a marking that is clearly intentional and differentiated into separate sets. Such symbolic marking requires a cultural tradition to establish its semantic content. Cognitively this is symbolism of a different order and abstraction from that found in an image such as the carved head which was both conceived and sculpted as a whole and which even today can be recognized as humanoid without any knowledge of the storied contents originally involved.

Such a marking of sets offers a number of possi-

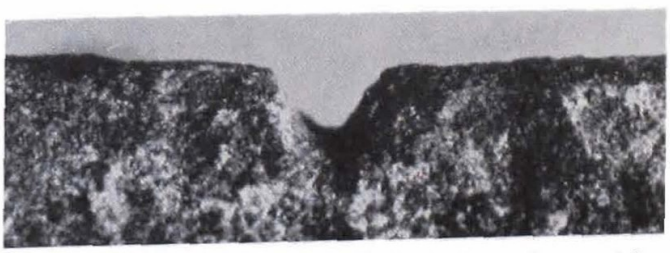

FIG. 145. Microphotographic detail of one of the large notches from the upper edge of fig. 141*d*. Photo: Marshack.

bilities for interpretation. It is possible that the act of marking itself had symbolic meaning as a gesture of participation in some continuing storied or mythologized equation. In that sense, engraving would be comparable to a laying on of color or even to the repeated handling of a ritual object. It would be *part* of a more complex ritual. In such a case, the effective equation may have been more concerned with the act of marking than with the stone which served merely as a carrier of the act. It is possible, on the other hand, that it was the stone, perhaps even its geometric shape, that had the primary meaning and that the act of marking it had symbolic significance as an act of inclusion in the meaning and image of the stone. Or it may have been that the marks had a notational meaning with a specialized content for each unit mark, the set, and the superordinate sum of all the marks. Such a notation might be a mnemonic device or a tally for ritual, calendric, menstrual, economic, or practical usage. In all these cases, the marking might superficially look the same, except that in the latter case an internal structure and patterning would be more apparent, particularly in the analyses of many pieces. Since we have only the one stone from Aq Kupruk the analysis of a *tradition* is difficult.

It is of interest that comparable non-utilitarian and non-decorative flat stone slates appear with similar sets of notches on their right angle edges in the European Upper Palaeolithic of France. Two examples that are visually and cognitively comparable come from the site of Solutré, France.[58] Such notched stones appear in European cultures that made and used both art and notation in a complex variety of ways. In eastern Spain where a crumbling, soft limestone shale was the readily available material, edge notching was not practicable and the surfaces of the stones were marked with linear sets. In Italy irregularly shaped chunks of fine-grained hard stone were often available and these were engraved with sets on all their surfaces. In Czechoslovakia and throughout most of the Franco-Cantabrian area the basic engraving materials were bone, antler, and ivory, the products of the huge herbivore herds. These allowed for exceedingly fine sets of small marks. In general, the styles of engraving sets of marks were dependent on the materials that were regionally available or most used.

The two artifacts from Aq Kupruk are on stone and it remains to be learned whether there was a worked or engraved bone industry.

The author has found that the Upper Palaeolithic and later Mesolithic engraved sequences were often notational. Microscopic analysis has revealed that the sets or groups were often accumulated over relatively long periods. To the extent that these are notational we can assume that they were maintained and capable of explanation by an oral "telling" in a manner comparable to the way that meaning could be given to representational art. But I have also found that *non-notational* sets of marks were engraved in the Upper Palaeolithic and Mesolithic and that the act of marking the pattern had a unit meaning, much as a ritual act of coloring or tatooing or handling has. These patterns of marks apparently also had a storied meaning (Marshack 1969, 1970, 1971*a*, 1971*b*, 1972*a*, 1972*b*).

The two artifacts from Aq Kupruk, therefore, seem indicative of a rather complex, evolved and multileveled tradition of symbol usage with roots extending at least to the *Homo sapiens* cultures of the early Upper Palaeolithic.

Without any attempt at an explanation or interpretation of the meaning of either piece but merely by an analysis of the cognitive elements involved, I assume that the Aq Kupruk culture contained dispersed and acquired elements from cultural centers further west and north.

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[58] (1) Musée des Antiquités Nationales, Saint-Germain-en-Laye, #81170; (2) Faculté des Sciences, Université de Lyon, #A.1907.

THE FAUNA OF THE AQ KUPRUK CAVES: A BRIEF NOTE

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At Snake Cave (Aq Kupruk I), the following were identified from the Later Iron Age levels: domesticated *Bos;* wild and domesticated *Ovis;* domesticated *Capra; Equus caballus;* porcupine. The same fauna (minus the porcupine) appeared in the Early Iron Age.

The Chalcolithic and both the Ceramic and Non-Ceramic Neolithic have definite domesticated sheep and goat. In addition, a possible onager specimen was uncovered in a Chalcolithic level. A probable domesticated cattle also appeared in the Non-Ceramic Neolithic B layer, as well as Red Deer (*Cervus elaphus*), gazelle (*Gazella subgutturosa*), and horse (*Equus caballus*).

Only *Ovis orientalis cycloceros* was found in Kuprukian B.

According to Ellerman and Morrison-Scott (1951) and Kullmann (1965) the range of the Argali (*Ovis ammon*) and the Siberian Ibex (*Capra ibex siberica*) extended into the Hindu Kush, whereas the range of the smaller kindred species, the Urial (*Ovis orientalis*) and the Bezoar (*Capra hircus aegagrus*) extended no farther east than Herat. However, the small size of the sheep/goat material from the Kuprukian of Horse Cave (Aq Kupruk II) indicates that these latter two species were represented in prehistoric times. That they were present in the Hindu Kush until recently is indicated by the remains of sheep and goat sacrifices at Ajdahar-i-Sorkh Dar (The Valley of the Dragon), a shrine where the Hazrat Ali (son-in-law of the Prophet Mohammad) is supposed to have performed a miracle. Probably, the shrine itself dates to the prehistoric. The skulls found in a fissure near the shrine are *O. orientalis* and *C. h. aegagrus*.

Otherwise, the fauna from Horse Cave is modern (table 16), although some of the animals represented are not found in the region today. As is typical in the Near East and the rest of Asia, the introduction of firearms has had a disastrous effect on some species in Afghanistan, notably the Red Deer and the Urial.

If the Kuprukian levels are of great antiquity, this modern aspect of the fauna would parallel the situation at several late Pleistocene sites in the Near East and Central Asia, such as Teshik Tash, Belt and Hotu Caves, and Shanidar Cave.

TABLE 16

HORSE CAVE (AQ KUPRUK II) FAUNAL LIST

	Number of specimens		
	KUPRUKIAN		
	A	B	Total
Ovis orientalis cycloceros	4	4	8
Capra hircus aegagrus	8	1	9
Ovis/Capra	51	12	63
Cervus elaphus sp.	1	0	1
Bos/Cervus	5	0	5
Equus sp.	0	1	1
Canis aureus sp.	1	1	2
Vulpes sp.	0	1	1
Grand total:	70	20	90
CERAMIC NEOLITHIC LEVELS			
Ovis sp. (probably domestic)			1
Capra hircus hircus (domestic)			1
Capra hircus ssp.			2
Ovis/Capra			20
Bos sp.			4
Cervus elaphus ssp.			5
Gazella subgutturosa ssp.			1
Equus caballus ssp.			1
Equus sp.			3
Total:			38
NON-CERAMIC NEOLITHIC Several fragmentary domesticated sheep and goat; also several fragmentary *Ovis/Capra*			
IRON AGE			
Ovis sp. (presumably domestic)			2
Capra sp. (presumably domestic)			2
Ovis/Capra			15
Bos sp.			4
Canid fragment			1
Total:			24
EARLY ISLAMIC			
Ovis/Capra			4

TENTATIVE CONCLUSIONS AND TENTATIVE CHRONOLOGICAL CHARTS

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Our research has given us a few facts and many artifacts, many questions but few answers. The authors of these preliminary reports hope that readers will make comparisons and criticisms and correspond with us as we continue our research. However, several tentative conclusions (with built-in questions, of course) should be mentioned.

The Mousterian of Darra-i-Kur[59] has suggestions of Upper Palaeolithic blade elements, in addition to the possible transitional *Homo sapiens sapiens* skull fragment, and may possibly be in the zone of the origin of the Upper Palaeolithic blade industries which spread westward through Asia, Europe, and North Africa. Pradel[60] recently presented an interesting discussion of the transition from Middle to Upper Palaeolithic in which he attempts to relate Stone Age tool kits to skeletal remains. He suggests that certain transitional combinations may be found in the Near East. The Darra-i-Kur finds tend to support his speculations. In other words, north Afghanistan may possibly be in a zone where a variety of modern man developed physically, in association with a developing Upper Palaeolithic tool assemblage.

Two upper Palaeolithic areas have been identified in Afghanistan as of early 1969: Coon's Kara Kamar "Aurignacian" (consisting of 82 implements) dating about 34,000 B.P., and the Kuprukian (about 20,000 utilized and worked flints), dating *ca.* 20,000–15,000 B.P.[61] Of the 82 implements found at Kara Kamar, 52 were nosed scrapers (some are carinated-type), "Aurignacian-type" blades, unutilized microblades, and one drill. No burins were found.[62]

The well-developed, long established Kuprukian still sits in limbo with no definite comparative assemblages known in Central Asia, the Middle East, or the Indian subcontinent. Further research in the area should ferret out more than the hints which exist now, for, after all, Aq Kupruk has proved to be a major Upper Palaeolithic area. Possibly, the presence of the excellent flint raw-material plus a total favorable, regional ecology during the late Pleistocene may

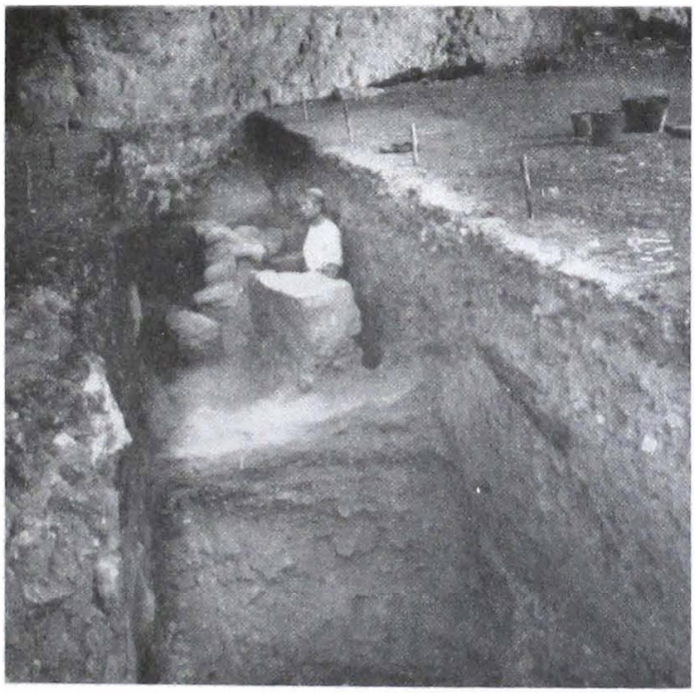

FIG. 146. Aq Kupruk I: Livestock retaining wall. Later Iron Age. Photo: Dupree. 1962.

FIG. 147. Aq Kupruk: Modern livestock retaining wall near Aq Kupruk I. Photo: Dupree. 1962.

[59] Mention should be made of the amorphous flint tools collected by Puglisi, 1963, near Hazar Sum. He calls the collection "Clactonian," but more work is necessary before this claim can be substantiated.

[60] Pradel, 1966.

[61] A third as yet undescribed industry, but from brief reports similar to the Kuprukian, was discovered by Puglisi at Darra Kalon (*Radiocarbon*, 9, 1967).

[62] Coon, 1957.

TENTATIVE CHRONOLOGICAL CHART 1

AQ KUPRUK I (GHAR-I-MAR, SNAKE CAVE)

Stratigraphy	Cultural period	Radiocarbon dates[1]	Lithic implements	Bone implements	Pottery[2]	Unusual objects	Metal[3]	Glass[4]	Fauna[5]	Human remains
Top blackish humus and loess; hearths	Early Islamic (pre-13th century A.D.) nomadic peoples	None	None	Awls	Early Islamic glazed wares. Red, buff utilitarian wares	None	Iron: knife; unidentified fragments	Glass fragments	Domesticated sheep, goat, cattle, horse	None
Reddish and brown earth; intensive occupation; hearths; brick and pisé complex	Later Iron Age (Kushano-Sasanian)	Hv 426: 1390±60 B.P. Hv 427: 1340±70 B.P. UCLA 1363 D: 1460±60 B.P. UCLA 1363 B. 1320±60 B.P. P-1489: 1276±40 (1315±41[6])	Flint drills	Awls	Red Streak-Pattern Burnished ware. Red broad band painted rim ware. Red or black on buff painted ware, repeated spirals the dominant motif. Buffish ware with wavey comb-marked striations. A punctated and appliqued buffish ware. Large storage jars	Livestock retaining wall of pisé and rectangular, sun-dried brick (40×40×10 cm; each weighing 10 kilos (figs. 146–151). Defaced Buddhist paintings in Upper Cave surrounded by similar brick wall. Two bar loom. Wooden projectile point (?). Snakeskin-covered wooden handle for dagger(?). Textile fragments. Basket fragments. Querns and pounders	Iron: unidentified fragments, needle, point, knife fragments, nail or rivet. Bronze: unidentifiable fragments	Unidentifiable fragments	Domesticated sheep, goat, cattle, horse. Wild goat (*Capra hircus aegagrus*). Porcupine. *Ovis* sp.	None
Gray-brown and reddish loess overlying Cave Gravels I Climate: probably drier than underlying strata	Early Iron Age (various Central Asian nomadic occupations)	Hv 1359: 1635±70 B.P. Hv 1360: 1645±70 B.P. Hv 1361: 1635±65 B.P. UCLA 1363 A: 1750±60 B.P. UCLA 1363 C: 1640±60 B.P. P-1490: 1614±41 (1663±42[6]) P-1491: 1436±47 (1480±48[6]) P-1492: 1602±48 (1651±49[6])	Flint end scrapers, side scrapers, blades, awls	Awls, points, needles	Red on buff dominates, but black on buff common. Designs include: free-flowing repeated spirals, wavy lines, checkerboards, faunal and floral motifs, dot-tipped rosettes. Polychrome sherd with swastika and fish (?) motifs. Sherd with gold leaf and blue paint. Red and buff utilitarian wares. Limestone tempered utilitarian ware	Terracotta sheep figurine (fig. 152). Terracotta male figurine (fig. 153). Terracotta female (?) figurine (fig. 154). Terracotta beads, spindle whorls. Carnelian beads	Iron: Many unidentified fragments. Bronze: Trilobate projectile points (fig. 155), bracelets, and bracelet fragments, rings, socketed projectile points and earrings. Fragment of Chinese coin, possibly Han or T'ang	Glass beads	Domesticated sheep, goat, cattle, horse. *Capra hircus aegagrus*. *Ovis* sp.	None
GAP-break in cultural sequence: erosional truncation										
Upper third of Cave Gravels I	Chalcolithic	Hv 428: 7220±100 B.P. Hv 429: 7030±110 B.P.	Flint: cores, blades, perforators, end scrapers on blades. No geometrics but many microblades	Points, awls, needles	A relatively hardfired ware with zigzag motifs under rim (may be intrusive). A cruder, soft, chaff, limestone and crushed sherd tempered ware. Some sherds with basket impressions	None	Fragment of bossed, beaten, copper, hammered on object such as wooden shield (?); 3 other copper fragments	None	Domesticated sheep, goat, cattle. Possibly onager	None
Middle third of Cave Gravels I	Ceramic Neolithic	Hv 1354: 6765±85 B.P. Hv 1356: 6310±70 B.P. Hv 1357: 6955±75 B.P.	Same as Chalcolithic	Same as Chalcolithic	Black, soft ware; no decorations	None	None	None	Domesticated sheep, goat	None

CHART 1.—*Continued*

Stratigraphy	Cultural period	Radiocarbon dates[1]	Lithic implements	Bone implements	Pottery[2]	Unusual objects	Metal[3]	Glass[4]	Fauna[5]	Human remains
Lower third of Cave Gravels I Climate: probably, wetter than overlying strata	Non-Ceramic Neolithic B	None	Same as Ceramic Neolithic, but more sickle blades, plus cores, microblades, end and side scrapers, points, burins, occasional backed blades. One pressure-flaked, unifacial point	Same as Ceramic Neolithic	None	Pecked stone hoes. Querns, pounders (fig. 156). Steatite bowl fragment	None	None	Domesticated sheep, goat, possibly cattle (?). Red deer (*Cervus elaphus.*) *Gazella subgutturosa. Equus caballus*	None
Sterile Sands										
Upper half of Cave *Gravels II*	Non-Ceramic *Neolithic A*	Hv 425: *8650±100 B.P.*	Same as Non-Ceramic *Neolithic B* but smaller percentage of sickle blades and more Kuprukian (Upper Palaeolithic) industry types	Same as Non-Ceramic Neolithic B	None	None	None	None	Domesticated sheep, goat	None
Lower half of Cave Gravels II Climate: probably moister than overlying strata	Kuprukian B (Upper Palaeolithic)	None	(See description under Aq Kupruk II.) An unique shouldered point	Polished points, spatula	None	None	None	None	*Ovis orientalis cycloceros*	None
Sterile Gray Sand										
Thin Cave Gravels III, Sterile										
Yellowish-red Clay, *sterile*										
Water table										

[1] Radiocarbon samples were analyzed by four laboratories: Niedesrächsisches Landesamt Für Bodenforschung, Hannover, West Germany (Hv is lab report symbol); Geochron Laboratories, Inc., Cambridge, Mass. (Gx, lab symbol); Institute of Geophysics, University of California at Los Angeles (UCLA, lab symbol); Radiocarbon Laboratory, Department of Physics, University of Pennsylvania (P, lab symbol). B.P. means Before Present or 1950 A.D.
[2] See Dupree and Kolb chapter.
[3] See Caley chapter.
[4] See Brill chapter.
[5] Dr. Dexter Perkins, Jr. identified the faunal remains.
[6] Dates in parentheses calculated with 5730 half-life and probably more realistic.

TENTATIVE CHRONOLOGICAL CHART 2

AQ KUPRUK II (GHAR-I-ASP, HORSE CAVE)

Stratigraphy	Cultural period	Radiocarbon dates	Lithic implements	Bone implements	Pottery	Unusual objects	Metal	Glass	Fauna	Human remains
Upper humus and loess	Early Islamic nomadic—pre-13th Century A.D.	None	None	None	Early Islamic glazed ware	None	Iron: projectile points; unidentified fragments	Beads. Fragment	Domesticated sheep, goat	None
Lower part of upper loess	Iron Age (?)	UCLA 1363 E: 2530±85 B.P.	None	None	Painted ware with spiral motif. Fabric impressed ware. Large storage pots. Limestone temper ware. Cream surface ware	None	Iron: projectile points, knives, fragments. Bronze: bracelet fragment	Fragment	Domesticated sheep, goat, cattle. *Capra* sp. *Ovis/capra*. *Canid* sp.	None
Loess overlying upper gravels Climate: probably increasing dryness.	Ceramic neolithic	UCLA 1363 F: 4500±60 B.P.	Flint: cores, sickle, blades, scrapers, bladelets, denticulated tools, burins, one unifacial pressure-flaked point	Awls, points, needles. Spatula	Software with sherd and chaff temper	Limestone hoe, querns, pounders, celts, steatite bowl fragments. Incised tortise shell	None	None	Domestic sheep, goat, *Capra*, sp. *Ovis/capra*. *Bos* sp. *Cervus elaphus*. *Gazella subgutturosa*. *Equus caballus*. *Equus* sp.	None
Upper part of AK II Cave Gravels Climate: probably drier than underlying strata	Non-Ceramic neolithic	Hv 1355: 10210 ±235 B.P.	Same as Non-Ceramic Neolithic, AK I	Awls, spatula	None	None	None	None	Domesticated sheep/goat. *Ovis/ Capra*	None
Middle Cave Gravels Climate: probably wetter than overlying strata	Kuprukian B (Upper Palaeolithic)	Hv 1358: 16615 ±215 B.P.	Flint blade and flake plus microindustry: cores, blades, scrapers (side and end), carinated scrapers, points, dihedral and snapped angle burins. Microcomponent includes cores, utilized and worked bladelets, points, possible burins. Anvils. Utilized pebbles and pebble tools	Spatulas	None	None	None	None	*Capra hircus aegagrus*. *Ovis/ Capra*. *Cervus elaphus*. *Bos/ Cervus*. *Canis aureus* sp.	None
Lower Cave Gravels	Kuprukian A (Upper Palaeolithic)	None	Flint blade and flake plus microindustry similar to Kuprukian B phase	Spatulas	None	Sculptured pebble, possibly representing a human face	None	None	*Ovis orientalis cycloceros*. *Capra hircus aegagrus*. *Ovis/ Capra*. *Equus sp*. *Canis aureus sp*. *Vulpes sp*.	None
Limestone floor of cave										

TENTATIVE CHRONOLOGICAL CHART 3

AQ KUPRUK III (OPEN-AIR SITE)

Stratigraphy	Cultural period	Radio-carbon dates	Lithic implements	Bone implements	Pottery	Unusual objects	Metal	Glass	Fauna	Human remain
Thick loess overlying River Gravels I. Flint implements occur in upper levels of gravels in contact with loess	Kuprukian B	None	Flint blade and flake plus micro-industry. (See assemblage described under Aq Kupruk II)	Polished point. Decorated bone point. Incised fragments. Spatulas	None	Rectangular flat stone with incised markings (See Marshack Chapter)	None	None	None identifiable	None
Sterile silts-clays										
River Gravels II	Kuprukian A	None	Flint blade and plus micro-industry	None	None	None	None	None	None	None
Water table										

TENTATIVE CHRONOLOGICAL CHART 4

AQ KUPRUK IV (SKULL CAVE)

Stratigraphy	Cultural period	Radio-carbon dates	Lithic implements	Bone implements	Pottery	Unusual objects	Metal	Glass	Fauna	Human remains
Intensive burial area, surrounded by wall of large stones. Skeletons somewhat disarticulated by later disturbances, probably burrowing animals.	*Ca.* 5th-6th Centuries A.D., possibly earlier, but probably post B.C.-A.D. line.	None	None	None	Red Streak-Pattern Burnished ware. Plain red, utilitarian ware. Pottery lamp, cup, and unguent (?) jar	Jewelry: silver ring with lapis setting; carnelian beads; lapis lazuli beads	Bronze: mirror; bracelets and bracelet fragments; rings; ear-rings; projectile points. Iron: point; knives or dagger; horse trappings (including bridle rings)	None	None	10-11 skeletons

FIG. 148. Aq Kupruk I. Close-up of several bricks *in situ*. Photo: Dupree. 1962.

FIG. 149. Aq Kupruk I. Close-up of brick (40 × 40 × 10 cm.) with circle. Photo: Dupree. 1962.

TENTATIVE CHRONOLOGICAL CHART 5

DARRA-I-KUR

Stratigraphy	Cultural period	Radiocarbon dates	Lithic implements	Bone implements	Pottery	Unusual objects	Metal	Glass	Fauna	Human remains
Blackish top loess, hearth complexes	Timurid (15th–16th centuries A.D. and later.	None	None	Points	Timurid (?) glazed sherds: vertical lug pottery with incised rims	Stone spindle whorl (?). Steatite stone lamp fragment. Grinding stones. Pounders.	None	None	Domesticated sheep, goat. Tortoise	None
Grayish loess; hearth complexes	Later Iron Age, possibly Kushan (*ca.* 1st–3rd centuries A.D.)	None	None	Points	Mainly a plain red ware; some striated sherds; one stamped Kushan sherd near top of level.	Grinding stones. Pounders	Iron: points with triangular cross-section; knife; possible Chinese knife-money fragment.	None	Domesticated sheep, goat. Horse. Rodents. Tortoise.	None
Upper gravels and brownish loess on top of lower gravels	"Goat Cult" Neolithic	Gx 0910: collagen: 3780 ±130 B.P. carbonate: 3425 ±125 B.P.	Flint: points, sickle blades. Broken jasper point. Three celts, one with worked butt. Slate knife and pendant. Slate scrapers. Limestone blade. Obsidian (?) bracelet fragment. Steatite (?) spindle whorl. Unfinished pendant in local stone called *sang-i-Hazrat Sayyid*. Diabase points. Basaltic hammerstones. Quartzite pebble tools	Awls, gouges, polished sheep astraguli, one perforated long bone (amulet?) spatula, polishers, needles	Crude black and red ware. Incised, channeled, punctated decorations: chevrons, parallel lines, triangles, ladder, cross-hatching, zigzags. Basket markings on interior of some sherds. Some finger-impressed rims. Perforated sherds. Pottery discs. Pottery slag in abundance	Perforated shell ornament (?). Post holes (?), possibly for tents or lean-tos	Two fragments unidentifiable copper	None	3 pit burials of domesticated goats, two without heads, one with (fig. 157). Domesticated cattle. Onager. Horse (*Equus przewalskii*). Wolf. Fox. Marten. *Gazella subgutturosa*. Wild *Capra* sp. (?). Bird bones. Fish bones. Rodents. Tortoise	Skull fragments and several long bones of one or two children under Goat Burial 3
Reddish gravels on top of compacted yellowish and greenish clays (overbank deposits). Major roof fall and sandy pebble levels separate Neolithic from Middle Palaeolithic. Grayish loess on top of rock fall contains Mousterian tools rolled down from limestone floor, as well as Neolithic sherds	Middle Palaeolithic (Mousterian)	Gx 1122: 30,000 +1900, −1200 B.P.	Between 800–900 flakes (Primary, utilized and worked) made from a local, "ratty" flint or chert, impure jasper, quartzite, basaltic pebbles, and an unidentified yellow stone. Tool types include: cores (including Levallois cores), Levallois flakes, Levallois points, hand-axes, side scrapers, flake-blades, possible burin-point and burin on blade. Limestone chopping tools	None	None	Worked shark tooth (?) point	None	None	Fossil clams and crab in overbank deposits. Unidentified sheep/goat in gravels. Large unidentified cattle sp., possibly *Bos primigenus*	Large skull fragment (temporal)

TENTATIVE CHRONOLOGICAL CHART 6

HAZAR GUSFAND (THOUSAND SHEEP)

Stratigraphy	Cultural period	Radio-carbon dates	Lithic implements	Bone implements	Pottery	Unusual objects	Metal	Glass	Fauna	Human remains
Black humus and brownish loess at top; yellow loess blending into yellowish clays on bottom Heavy roof fall blocks underlying levels at varying from 1.5–2.5 meters	Mixed Early Islamic and Later Iron Age	None	Limestone point and scraper; quartzite scraper	None	Timurid (?) glazed sherds; one blue-white Chinese import (?); ring base sherd. Pottery slag	None	Iron: points; knife fragment; sickle handle	Green glass fragment	Sheep goat, probably all domesticated. Tortoise. Rodents. Two articulated goat skeletons (burials?)	Skull fragment

have made the area conducive to intensive occupation by hunter-gatherers.

Coon's Kara Kamar "Mesolithic" (58 flint tools, primarily microcores and microblades), dating *ca.* 10,500 B.P., has a technological flavor different from that of the microcomponents of the Kuprukian.[63] The microblades of the Kuprukian were uniformly parallel sided and longitudinally flat. The Kara Kamar "Mesolithic" microblades can be divided into two groups: unretouched pointed microblades and ordinary microblades, both of which exhibit pronounced longitudinal curving, indicating a different pressure technique from that used by the Kuprukian population.

Therefore, the "Mesolithic" of Kara Kamar could possibly have developed out of the Kuprukian, and may represent a phase of the Non-Ceramic Neolithic in the terms used for the Aq Kupruk sequence.

Domesticated sheep and goat have been definitely identified in the Non-Ceramic Neolithic of Aq Kupruk I and II. The plant remains (including carbonized grains) have yet to be studied. If the plant specimens prove to be transitional or domesticated, the foothills of the northern Hindu Kush must be considered one of the early centers for the domestication of plants and animals. Possibly the Middle Eastern

FIG. 150. Aq Kupruk I. Close-up of brick with three diagonal lines. Possibly all marking done with fingers; probably to give brick better adherence to mud and straw mortar. Photo: Dupree. 1962.

FIG. 151. Aq Kupruk I. Close-up of brick, showing dog paw prints made while brick still wet. Photo: Dupree. 1962.

[63] Davis, 1969.

FIG. 152. Aq Kupruk I. Figurine (?) of sheep. Early Iron Age. Photo: Klappert. 1962.

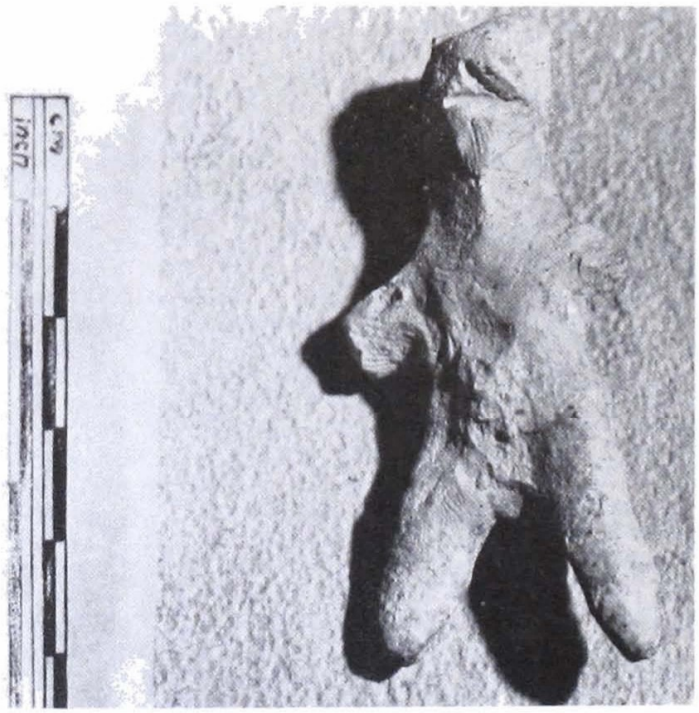

FIG. 153. Aq Kupruk I. Male figurine. Early Iron Age. Photo: Klappert. 1962.

FIG. 154. Aq Kupruk I. Female (?) figurine. Early Iron Age. Photo: Klappert. 1962.

wheat barley, sheep goat complex developed in a general latitudinal (34°-40° North), altitudinal (500–750 meters above sea level) zone stretching from north-central Afghanistan to Anatolia and probably the Aegean area. Most early Asian Neolithic sites of 9,000–11,000 B.P. fall within this latitudinal-altitudinal ecological zone. Today, even a slow walker (about 15 kilometers per day) can travel across this area easily in approximately six months.

A change in stratigraphy heralds the introduction of pottery at Aq Kupruk I and II. A soft ware (and possibly a harder ware with zig-zag chevron-type incisions) becomes common about 6-7,000 B.P. In addition to domesticated sheep and goat, a possible domesticated cattle appeared a little earlier than 8,000 B.P.

The late "Goat Cult" Neolithic of Darra-i-Kur, with its diagnostic incised pottery and intentional goat burials (one in association with the fragmentary skeletons of one or two children), apparently relates to the Neolithic of Kashmir, eastern Central Asia and South Siberia.[64] A line separating the area of the

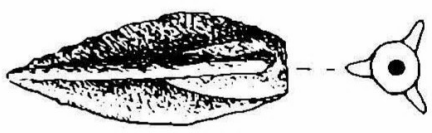

FIG. 155. Aq Kupruk I. Socketed, trilobate bronze projectile point. Early Iron Age. Drawn by Amorosi.

[64] Lal, 1964; Vinegradov, 1968.

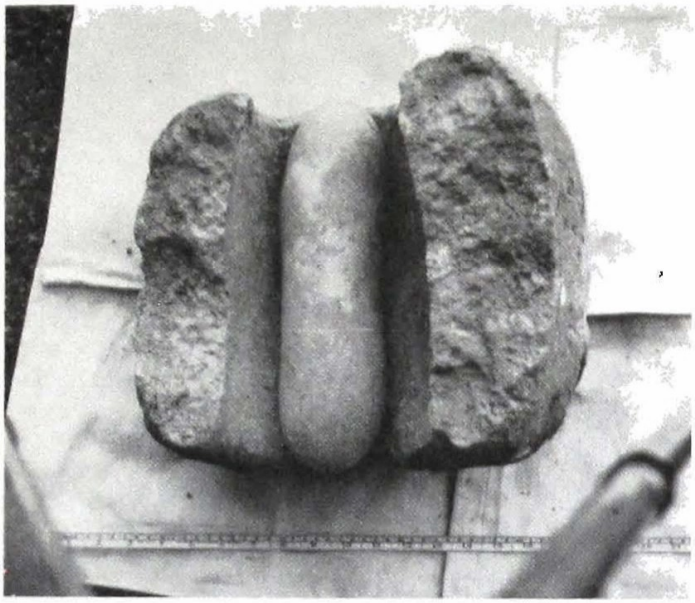

FIG. 156. Aq Kupruk I. Quern and pounder. Non-Ceramic Neolithic B. Photo: Dupree, 1962.

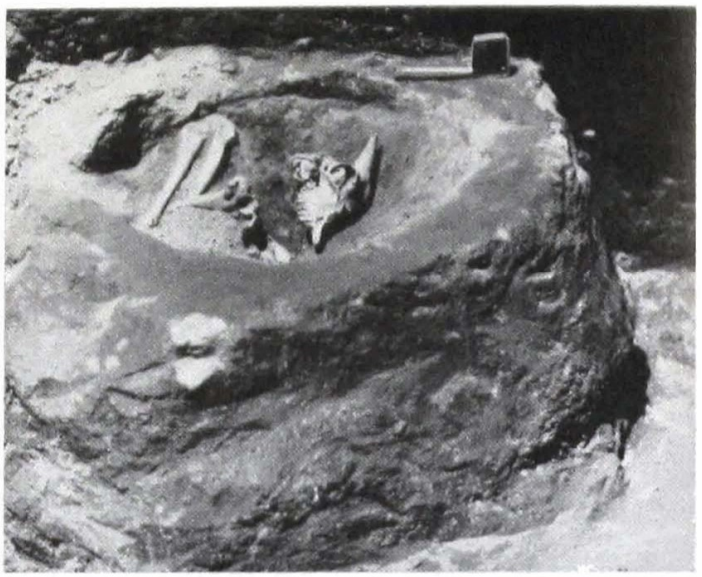

FIG. 157. Darra-i-Kur Neolithic. Goat Burial No. 3. Under goat skeleton, parts of skulls and long bones of 1–2 children found. Photo: Dupree, 1966.

beginning of the early foothill Neolithic of the Middle East (mixed farming of wheat barley plus domesticated sheep goat) and the later seminomadic, highland and steppe Neolithic of eastern Central Asia-Kashmir-South Siberia can possibly be drawn along the 68° East longitude, up from Kashmir, then swinging west and north into the steppeland along the 40° North latitude. Naturally, much more research is necessary to test such a tentative hypothesis.

The gaps, indicated by the erosional truncations at Aq Kupruk I and II can be partly filled by the finds at Mundigak and Deh Morasi Ghundai.[65]

[65] Casal, 1961; Dupree, 1963.

The identity of the peoples who left their cultural remains in the various Iron Age levels of Aq Kupruk I, II, III, Darra-i-Kur, and Hazar Gusfand remains a mystery. Obviously, the groups were related to those nomads who periodically swept out of Central Asia in the late centuries B.C. and early centuries A.D., but much remains to be collated before we attempt any identifications. Comparisons must also be made with the rapidly accumulating archaeological evidence from Soviet Central Asia, Iran, Pakistan, and India.

We end as we began, emphasizing the tentativeness of the framework in which we now work. The preceding Tentative Chronological Charts present the current, though quicksilver, status of our thinking.

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